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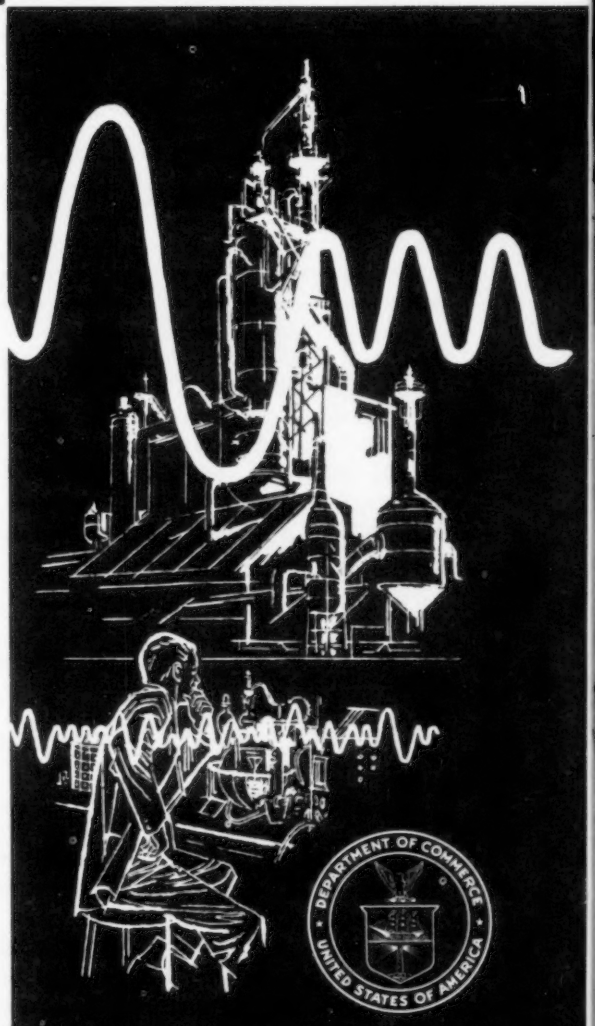

U. S. DEPARTMENT OF COMMERCE
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U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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*HYPERVELOCITY VEHICLES

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•VIBRATION ISOLATORS

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•VIRUS DISEASES

THIS BIBLIOGRAPHY CONTAINS JOURNAL REFERENCES COVERING THE YEARS 1928 TO OCTOBER 1956 ON DENGUE AND YELLOW FEVER VIRUSES. IT INCLUDES REFERENCES ON DIAGNOSIS AND IDENTIFICATION; MORPHOLOGY AND METABOLISM; SEROLOGY; PATHOLOGY; INSECT VECTORS; STORAGE; EPIDEMIOLOGY; AND EPIDEMIC COUNTRIES.
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•VIRUSES
BIBLIOGRAPHY

THIS BIBLIOGRAPHY CONTAINS JOURNAL REFERENCES COVERING THE YEARS 1928 TO OCTOBER 1956 ON DENGUE AND YELLOW FEVER VIRUSES. IT INCLUDES REFERENCES ON DIAGNOSIS AND IDENTIFICATION; MORPHOLOGY AND METABOLISM; SEROLOGY; PATHOLOGY; INSECT VECTORS; STORAGE; EPIDEMIOLOGY; AND EPIDEMIC COUNTRIES.
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•WEATHER FORECASTING

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PROGRESS REPORT FROM U. OF WASHINGTON ON PROGRAMS IN MICROMETEOROLOGY; CARBON DIOXIDE MEASUREMENTS; SEA ICE PHYSICS; ENERGY TRANSFER FROM OPEN SEA WATER TO COLD AIR; AND SOIL TEMPERATURES.
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•WELDS

FATIGUE BEHAVIOR OF WELDED JOINTS AND WELDMENTS IN HY-80 STEEL SUBJECTED TO STRESS CYCLES OF COMPLETE REVERSAL, ZERO-TO-TENSION, AND HALF TENSION-TO-TENSION.
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A STUDY OF WIND SHEAR IN THE JET STREAM OVER WHITE SANDS MISSILE RANGE, NEW MEXICO.
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AD-290 714 DIV. 14

RESULTS-TYPE SPECIFICATIONS FOR TREATED WOOD; RELIABILITY AND STANDARDIZATION OF PRESERVATIVE RETENTION ASSAYS FOR POLES; PILING AND LUMBER; INSPECTIONS AT TREATING PLANT AND/OR AT DESTINATION. ASSAY OF BORINGS.
AD-290 716 DIV. 14

TIMBER JOINTS WITH METAL FASTENERS SUBJECTED TO LATERAL-IMPACT LOADS. TWO MEMBER WOOD JOINTS FASTENED WITH NAILS; BOLTS OR LAG SCREWS WERE TESTED AND A RELATIONSHIP WAS ESTABLISHED BETWEEN MAGNITUDE OF IMPACT FORCE; JOINT SLIP; FASTENER DIAMETER AND SPECIFIC GRAVITY OF WOOD MEMBERS.
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•WOOD
BONDED JOINTS

QUALITY CONTROL OF GLUE JOINTS IN LAMINATED BEAMS BY USING CYLINDRICAL PLUGS AS SHEAR SPECIMENS.
AD-290 715 DIV. 14

•WOOD PULP

PROCEDURE FOR DETERMINING HAZE-FORMING TENDENCY OF WOOD PULPS AFTER ACETYLATION AND THE AMOUNT OF INSOLUBLE RESIDUE IN THE ACETATE SOLUTION.
AD-290 717 DIV. 14

•WOOLEN TEXTILES

THERMAL CONDUCTIVITY MULTILAYER UNDERWEAR (50% WOOL, 50% COTTON) AT 65 TO 135 FT CONTROLLED ATMOSPHERE AIR, WATER, HE, FREON-12.
AD-290 744 DIV. 14

•WORK FUNCTIONS

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•X-RAY ABSORPTION ANALYSIS

A DEVICE FOR ACCURATE REPOSITIONING OF AN X-RAY DIFFRACTION GONIOMETER.
AD-290 685 DIV. 25

•X-RAY DIFFRACTION ANALYSIS

DESCRIPTION OF CARBON CRYSTALLITE GROWTH KINETICS EXPERIMENT.
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COMPUTER PROGRAMS FOR ANALYSIS OF BROADENING OF DIFFRACTION PEAKS.
AD-291 048 DIV. 25

•X-RAY PHOTOGRAPHY

INTERNAL BODY MOVEMENTS RESULTING FROM EXTERNALLY APPLIED SINUSOIDAL FORCES. X-RAY OBSERVATIONS OF VISCERAL RESPONSE OF DOGS TO VIBRATION.
AD-290 500 DIV. 25

•YTTRIUM COMPOUNDS

FLOATING ZONE TECHNIQUE PRODUCING SINGLE CRYSTAL YTTRIUM IRON GARNETS; FERRIMAGNETIC RESONANCE; DIELECTRIC CONSTANT; THERMAL CRACK FORMATION.
AD-290 738 DIV. 25

•ZINC

EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM. PHYSICS OF SOLIDS AT MICROWAVE FREQUENCIES.
AD-290 306 DIV. 25

•ZINC COMPOUNDS

SUMMARY CONCERNING AC ELECTROLUMINESCENCE OF ZNS POWDER. NOVEL BASIC OBSERVATIONS AND NEW MEASUREMENTS ON EL LINES IN POWDER PARTICLES ARE DESCRIBED.
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•ZIRCONIUM COMPOUNDS

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AD-290 693 DIV. 14

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-289 818 Div. 1, 26
(TISTM/EJH) OTS price $2.60

MSA Research Corp., Callery, Pa.
HYDROGEN GENERATION FOR HIGH ALTITUDE BALLOONS.
Quarterly progress rept. no. 1, 1 July-1 Oct 62,
by W. J. Carter, R. A. Spencer, and M. J. McGoff.
26 Nov 62, 24p. incl. illus. (Rept. no. MSAR 62-147)
(Contract DA 36-039-sc-90699, Proj. 3M-36-21-004-02)
Unclassified report

DESCRIPTORS: *Balloons, *Gas generating systems, *Hydrogen, Pneumatic devices, Pellets, Sodium compounds, Borohydrides, Aluminum compounds, Hydrides, Foams, Water, Catalysts, High altitude.

Small scale laboratory investigations of $NaBH_4$, $NaAlH_4$ and aluminum were completed, and large scale hydrogen generation tests were initiated. Formulation and preparation of $NaBH_4$ and $NaAlH_4$ pellets from small scale reactions were completed. Large scale tests with $NaBH_4$ and $NaAlH_4$ were conducted to determine parameters required for the design of a suitable generator. Five designs were used to evaluate the problems connected with the use of $NaBH_4$. Problems found with the large scale tests but not in small scale tests were foaming and moisture entrainment. In a single full scale test with $NaBH_4$ using a preliminary Model V generator, the balloon was filled to over 42 in. diameter in 11 minutes. (Author)

AD-290 061 Div. 1
(TISTM/BRW) OTS price $11.50

North American Aviation, Inc., Columbus, Ohio.
GENERALIZED HONEYCOMB THERMAL STRESS STUDY,
by Lloyd E. Hackman and C. W. Annis. 1962, 142p. incl. illus. tables (Rept. no. NA 61H-755)
(Contract Now 61-0355-d)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, Thermal stresses, Stresses, Mathematical analysis, Nuclear explosions, Aerodynamic heating, Aircraft, Design, Stability, Box beams.

A study was initiated to develop a Generalized Honeycomb Thermal Stress Analysis which would offer the capability of predicting thermal limits for any aircraft subjected to the effects of a nuclear explosion. The method developed for this contract is based upon a recently developed Allowable Stress Method with the capability of predicting the allowable load on any structural cross-section in any flight and thermal exposure environment. The Allowable Stress Method is considered one of the most important developments in analysis of aircraft structures in recent years. Such an approach gives the user not only a nuclear effects analysis method but a Generalized Allowable Structural Loads Method. Another study was initiated to develop design procedures for a weapons system subjected to the effects of a nuclear explosion. The design procedures developed during this study provide a method of deriving the minimum weight configuration to provide the needed delivery or escape capability. The optimization of composite structures with a thermal gradient present is a break-through in automated design methods. The procedure with minor modification can be used for the aerodynamic heating problem as well as the nuclear effects heating problem. (Author)

AD-290 062 Div. 1
(TISTM/BRW) OTS price $22.25

North American Aviation, Inc., Columbus, Ohio.
GENERALIZED HONEYCOMB THERMAL STRESS STUDY, APPENDICES,
by Lloyd E. Hackman and C. W. Annis. 1962, 1v. incl. illus. tables (Appendices to NA61H-755)
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Unclassified report

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AD-290 317 Div. 1
(TISTA/GEC) OTS price $4.00

Vertol Div., Boeing Co., Morton, Pa.
A STUDY OF TANDEM HELICOPTER FUSELAGE VIBRATION. Final report on Dynamic Problems in Flight Vehicles,
by Robert G. Ricks. Sep 62, 285p. incl. illus. tables, 12 refs.
(Contract AF 33(616)5240, Proj. 1370)
(ASD TDR 62-284) Unclassified report

DESCRIPTORS: *Helicopters, Helicopter rotors, Fuselages, Load distribution, Frequency, Design, Flight testing, Aerodynamics, Aerodynamic data, Mathematical analysis, Elasticity, Loading, Deformation, Equations, Motion, Vibration.

A comprehensive research program covering many facets of tandem rotor helicopter fuselage vibration was conducted. Analytical portions consisted of the development of methods for the prediction of fuselage natural and forced modes; test portions of the program determined fuselage stiffness properties, rotor shaft vibratory loads and in-flight natural frequencies, modes and vibration levels. The results have proven to be of considerable value in the design of the present generation of helicopters. (Author)

AD-290 593 Div. 1, 12, 25
(TISTM/BRW) OTS price $3.50

Republic Aviation Corp., Farmingdale, N. Y.
THERMO-STRUCTURAL ANALYSIS MANUAL.
Final report on Structural Design Criteria,
by M. J. Forray, M. Newman, and H. Switzky.
Oct 62, 1v. incl. illus. tables, refs. (Rept. no. RAC 128-1)
(Contract AF 33(616)6066, Proj. 1367)
(WADD TR 60-517, vol. 2)
Unclassified report

DESCRIPTORS: *Airframes, *Thermal stresses, Aircraft, Structural shells, Structures, Beams, Metal plates, Buckling, Stresses, Deformation, Mathematical analysis, Loading, Handbooks, Design.

This second volume of the Thermo-Structural Analysis Manual considers additional problems in the field of thermal and mechanical stress analysis not fully treated in Volume I. Special emphasis is given to nonlinear analysis of beams and plates and to axisymmetric thermo-elastic analysis of thin shells. Following the format of Volume I, nondimensional graphs, formulas and tables are developed where feasible. For clarification of the analytical techniques and the use of the numerical data, illustrative examples are given. The following problems are treated: (1) large deflection analysis of straight elastic beams with axial end restraint and axial end loads coupled with transverse loading and temperature, (2) approximate determination of the axial end loads and deformations in heated beam columns with initial eccentricities, (3) approximate solutions for the buckling of eccentric columns accommodating nonlinear stress-strain laws, (4) axisymmetric large deflections of circular plates subjected to thermal and mechanical loads, and (5) axisymmetric thermo-elastic analysis of thin shells. (Author)

AD-290 596 Div. 1
(TISTM/EJH) OTS price $1.10

Curtiss-Wright Corp., Caldwell, N. J.
LIGHT WEIGHT BLADE STUDY AND DEVELOPMENT PROGRAM.
Summary rept. on Phase 1, 2 Jan-30 June 62, by W. J. Jasinski. 26 July 62, 4p. (Rept. no. 001-7)
(Contract NOw 62-0279-d)
Unclassified report

DESCRIPTORS: *Propeller blades, *Glass textiles, Airplanes, Aerodynamics, Materials, Design, Reinforcing materials, Plastics, Mechanical properties, Feasibility studies.

Considering the contractural stipulation of a 13.5 ft. diameter turbo propeller blade for conventional aircraft equipped with engines rated from 3,000 to 4,000 shaft horsepower, it was established that the optimum blade should have an activity factor of 150 and an integrated design CL of .446. The evaluation studies in the material strength, manufacturing feasibility, and fabrication cost areas showed that a fiberglass reinforced plastic blade would fulfill the requirements to the best advantage. From the two above recommendations a complete blade study was performed on five basic materials on the basis of an assumed design condition and structurally optimized with considerations being given to manufacturing limitations and the working allowable stresses of each material. The optimum blade design resulted in a 52.4 pound fiberglass reinforced plastic blade which was calculated to be approximately 8 pounds lighter than the lightest clad metal blade design. (Author)

AD-290 798 Div. 1
(TISTA/GEC) OTS price $2.25

Bole, Beranek, and Newman, Inc., Cambridge, Mass.
NEW APPROACHES TO FLIGHT VEHICLE STRUCTURAL VIBRATION ANALYSIS AND CONTROL.
Final rept., Feb 61-Jan 62 on Dynamic Problems in Flight Vehicles,
by Manfred A. Heckl, Richard H. Lyon and others.
Oct 62, 76p. incl. illus. 35 refs.
(Contract AF 33(616)7973, Proj. 1370)
(ASD TDR 62-237) Unclassified report

DESCRIPTORS: *Airframes, *Structures, *Vibration isolators, Acoustics, Analysis, Control, Excitation, Energy, Absorption, Elasticity, Viscosity, Springs, Damping, Beams, Diffusion, Vibration.

New methods are outlined for dealing with the vibration responses of complex flight vehicle structures to local and to diffuse acoustic excitation. Energy absorption at structural joints and acoustic radiation resistance are shown to be important in establishing levels of these responses. Some experimental results pertaining to energy absorption coefficients and radiation resistance are given, and procedures for estimating the latter are discussed. Feasibility studies of vibration absorbers utilizing viscoelastic spring elements and distributed mass systems and of vibration isolators compose of viscoelastic leaf springs are summarized. Only the latter are found to possess some practical advantages over conventional systems. The results of experiments are presented which demonstrate that sound-to-structure coupling may be reduced significantly by the use of beams of special design whose stiffness decreases with increasing frequency. An analytical investigation is summarized which shows that generally damping of only the plates summarized which shows that generally damping of only the plates of beam-plate systems may be more desirable than damping of only the beams. (Author)

AD-290 810 Div. 1
(TISTA/SEB) OTS price $3.60

Aerospace Information Div., Washington, D. C.
HIGH-ALTITUDE BALLOONS ANNOTATED BIBLIOGRAPHY (PRELIMINARY).
26 Nov 62, 31p. (AID rept. no. 62-190)
Unclassified report

DESCRIPTORS: *Balloons, *Bibliography, High altitude, Scientific research, USSR.

An annotated bibliography is presented (plus Appendix) of Soviet, Soviet-bloc, and American scientific and technical articles and monographs related to high-altitude balloons and their application in geophysics. The materials included in the bibliography have been derived from open-source specialized technical and popular scientific periodicals available at the Aerospace Information Division and the Library of Congress. Titles of Soviet monographs are given in transliterated form followed by the English translation. Titles of German monographs are given in the original German followed by the English translation. The entries in the annotated bibliography and the appendix are arranged alphabetically by author. Library of Congress call numbers are given at the end of an entry when the item is cataloged and available in the collections of the Library. (Author)

AD-290 838 Div. 1
(TISTA/GEC) OTS price $9.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HELICOPTER IN THE SERVICE OF GEOLOGY AND OTHER BRANCHES OF THE NATIONAL ECONOMY,
by A. A. Mel'nik. 17 Oct 62, 105p. incl. illus. table (Trans. no. FTD-TT-62-180 from Vertolet Na Sluzhbe Geologii I Drugikh Otrasley Narodnogo Khozyaystva, 1960)
Unclassified report

DESCRIPTORS: *Helicopters, Economics, Cargo, Agriculture, Air transportation, Costs, Airports, Aviation safety, Geological survey, Translations, USSR.

The use of helicopters in the work of expeditions carrying on geological, topographic or valuation surveys in the taiga country and other nearly impassable regions is studied. While helicopters are widely used in the country's economy, their mechanical and flight characteristics have not been fully explored. Further possibilities of using the helicopter as a means of transportation are studied. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-289 613 Div. 2
(TISTP/FR) OTS price $10.50

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMIC PROPERTIES AND SHOCK-WAVE CHARACTERISTICS OF A MODEL VENUS ATMOSPHERE,
by W. C. Strahle. Nov 62, 124p. incl. illus. tables, 24 refs. (Memo. RM-2826-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Atmosphere models, *Venus, Carbon dioxide, Nitrogen, Thermodynamics, Shock waves, Electrons.

A model for the atmosphere of Venus is developed which may be useful for design studies of early atmospheric-entry vehicles and for wind-tunnel simulation application. This atmosphere, derived from many questionable assumptions and scant experimental data, consists of 85% carbon dioxide and 15% nitrogen by volume. The thermodynamic properties of the derived atmospheric composition are presented over the temperature-pressure range of 150 to 24,000 K and 1/10,000 to 100 atm. To further assist in aerodynamic entry calculations, normal-shock-wave characteristics of such an atmosphere are also presented. The fact that nitrogen is present has important consequences in the thermodynamic properties and electron concentrations over the full temperature and pressure range. The effects are of the order of the percentage of nitrogen addition to pure carbon dioxide. A graphical method of obtaining oblique-shock-wave data and a method of obtaining electron concentrations at low temperatures are included as appendixes. (Author)

AD-289 808 Div. 2
(TISTP/JW) OTS price $2.60

Marine Lab., U. of Miami, Coral Gables, Fla.
MESO-SCALE STUDIES OF INSTABILITY PATTERNS AND WINDS IN THE TROPICS.
Interim technical rept. no. 1, 1 May-31 Aug 62, by Harold P. Gerrish and Homer W. Hiser.
31 Aug 62, 25p. incl. illus. tables, 9 refs.
(Rept. no. ML 8226-1)
(Contract DA 36-039-sc-89111, Proj. 3A99-27-005)
Unclassified report

DESCRIPTORS: *Meteorology, *Radar echo areas, Motion, Wind, Precipitation, Climatic factors, Tropical regions.

A concentrated case study of winds and precipitation echo movement in southern Florida is presented. The synoptic situation for the case and the winds aloft charts are discussed. Echo tracking equipment and procedures are described. Comparisons based upon streamline and isotach analyses are made between mean echo motion and upper air winds at grid points rather than by direct comparisons. Of the trackable echoes that existed at least 5 minutes, 72% could be tracked for 10 minutes, whereas only 36% could be tracked for 15 minutes and only 8% could be tracked for 30 minutes. Streamline analyses indicate high speed waves of short wavelength moving through the echo patterns. Wave speeds of 50 to 100 knots were indicated and in one case a 300-knot wave speed was noted. Regions of echo masses and areas of no echoes shed some doubt on the speed of these waves, however, small period variations in echo motion near a given point appear to confirm the existence of high speed waves. The convergent and divergent portions of these waves may supply a triggering action for growth and decay of clouds as they pass through an area. For comparison of echo motion with winds aloft, 50, 60, and 100-n. mi grids were used to space mean both echo motion and upper wind charts. Results indicate that in southern Florida, mean radar echo motion compares most favorably with the low level winds, in particular, the mean 5000-ft wind. (Author)

AD-289 837 Div. 2
(TISTP/FR) OTS price $3.60

Navy Mine Defense Lab., Panama City, Fla.
RESULTS OF A FIELD STUDY OF THE TIDE LINE MECHANISM,
by G. B. Austin and R. H. Payne. Mar 62, 34p. incl. illus. tables, refs. (Rept. no. 165)
Unclassified report

DESCRIPTORS: *Estuaries, *Tides, Underwater sound signals, Propagation, Underwater sound, Temperature, Salinity, Density, Visibility, Fluid flow.

The concentration of foam and trash to form a visible line along the boundary between two dis-

similar water masses is a daily occurrence in the waters near Panama City, Florida. The name 'tide line' is used to designate this phenomenon as its development and degeneration coincide with the ebb and flow of the tide. During the falling tide the water from St. Andrew Bay flows through the jetties into the Gulf of Mexico spreading outward as a thin surface layer. A brief investigation of this estuarine sea water boundary, carried out under various weather and sea conditions, was undertaken in the early winter of 1959. The thin layer of overlying estuarine water was found to be two to four feet deep with its front, the tide line, generally extending more than three miles offshore, before the rising tide caused its breakup. Abrupt changes in sound velocity, temperature, and salinity occurred at the interface between the estuarine and Gulf water masses. Based on the preliminary results obtained, a recommendation to continue investigation of tide line phenomenon is made. (Author)

AD-289 846 Div. 2
(TISTP/FR) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
FORECASTING WINTER TEMPERATURE IN SOUTHERN NEW ENGLAND,
by Joseph Chase. Nov 62, 13p. incl. illus. table, 10 refs. (Reference no. 62-37)
(Contract Nonr-219600, Proj. NR 083-004)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Barometric pressure, Temperature, Statistical analysis.

November mean pressure maps for the northern hemisphere are used to predict winter temperatures in Southern New England. It appears that the pressure patterns of winter correlate well with those of November when allowance is made for the normal November to winter pressure change. The system is dependent upon gauging the advection of cold air into New England during the winter. (Author)

AD-289 860 Div. 2
(TISTP/FR) OTS price $1.60

Texas A. and M. Coll., College Station.
SUMMARY CRUISE REPORT R. V. HIDALGO CRUISE 62-H-9, 27 JUNE-12 JULY 62, GALVESTON,TEXAS--CAMPECHE BANK.
Final rept.
12 July 62, 15p. incl. illus. (Reference no. 62-17T)
(Contract Nonr-211904, Proj. NR 083-036; Grant no. G-24892)
Unclassified report

DESCRIPTORS: *Depth finding, *Ocean bottom, Sedimentation, Sampling.

An instrument structure was established in 20 feet of water on the southern flank of the Arcas reef. This operation was a feasibility study designed to examine techniques to be used in instrumenting the Arcas reef for physical oceanographic studies. The reef study group, together with about seven tons of supplies, was landed on Cayo del Centro in the Arcas group and a base camp was established. Geological studies of reef sediments and processes were well under way when the R. V. Hidalgo left Arcas on Thursday, 5 July. A total of 73 sediment sample stations were occupied on the Campeche Bank following the completion of the Arcas program. In addition, 1698 miles of sounding track were obtained with the Precision Depth Recorder. This data is a contribution to the detailed bathymetric chart of Campeche Bank presently in preparation and to our bathymetry of the Gulf of Mexico project. Continuous gravity profiles were run with the La Coste-Romburg Shipboard Gravity Meter. Gravity data was obtained over a distance of approximately 1000 miles of ship travel. Fifty-seven bathythermograph stations were occupied between Galveston and Campeche Bank. (Author)

AD-289 861 Div. 2
(TISTP/JW) OTS price $12.50

Texas A. and M. Coll., College Station.
THE WATERS OF THE GULF OF MEXICO AS OBSERVED IN FEBRUARY AND MARCH 1962.
Data rept. for 12 Feb-31 Mar 62,
by Hugh J. McLellan and Worth D. Nowlin. Sep 62, 1v. incl. illus. tables (Reference no. 62-16D)
(Contract Nonr-211904, Proj. NR 083-036)
Unclassified report

DESCRIPTORS: *Oceanographical data, *Hydrographic surveying, Sampling, Thermometers, Tables, Gulf of Mexico.

AD-289 876 Div. 2
(TISTP/FR) OTS price $4.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
A COMPARISON OF DATA ACCURACY IN THE TROPOSPHERE AND IN THE STRATOSPHERE,
by John Bruce Hovermale. Sep 62, 42p. incl. illus. tables, 2 refs. (Scientific rept. no. 2)
(Contract AF 19(604)7261, Proj. 8641)
(AFCRL 62-1013) Unclassified report

DESCRIPTORS: *Wind, Stratosphere, Atmosphere, Measurement, Errors, Statistical analysis.

Estimates of the standard errors of observed and time-extrapolated data are made for the standard pressure levels from 700 mb through 25 mb. Error estimates are used to establish the relative importance of height and wind data in synoptic analysis and the relative importance of persistence data compared to observed values. (Author)

AD-289 878 Div. 2, 15
(TISTP/FR) OTS price $5.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
DATA ACCURACIES AND WEIGHTING FACTORS AT 50 MILLIBARS,
by John Bruce Hovermale. July 62, 55p. incl. illus. tables, 31 refs. (Scientific rept. no. 1)
(Contract AF 19(604)7261, Proj. 8641)
(AFCRL 62-896) Unclassified report

DESCRIPTORS: *Meteorological data, *Errors, Statistical analysis.

The accuracy of various types of 50 mb data is evaluated in of standard errors. The estimation of standard errors is made, for the most part, without specifying true values. The relative importance of the various types of data is then expressed in numerical form. Extrapolated data is shown to be of great relative value in synoptic analysis at 50 mb. Extrapolation by use of persistence seems to be the best means of supplying additional data in most cases. A question is raised as to validity of previous height error estimates in the stratosphere. (Author)

AD-290 203 Div. 2, 12, 25
(TISTP/JW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
SOLAR SYSTEM SCIENCE: 1961 LITERATURE SURVEY, PART IV,
by Donna Wilson. Nov 62, 36p. (Rept. no. P-2677)
Unclassified report

DESCRIPTORS: *Solar systems, *Space environmental conditions, *Bibliography, Dynamics, Geodesics, Atmospherics, Planets, Space probes, Satellite vehicles, Moon, Comets, Aurorae.

This bibliography was selected from the abstracts published in the ASTIA Technical Abstract Bulletins: U61-1-1, 1 January 1961 through U62-3-5, 1 September 1962 and the U. S. Government Research Reports, Vol. 35, No. 2, 10 February 1961 through Vol. 37, No. 17, 5 September 1962. The ratio of the number of entries selected to the number of abstracts surveyed is approximately 1/50. The large number of reports surveyed naturally prevented reviewing each individual report and therefore the information indicating the treatment of the subject matter (i.e., observation, interpretation, theory, etc.) is not included in this section. Almost all the reports in this bibliography bear, in addition to an ASTIA number, an OTS price and are available to any requestor from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D. C. (Author)

AD-290 240 Div. 2, 25
(TISTP/JW) OTS price $1.60

Washington U., Seattle.
(No title).
Annual rept. no. 2, 1 Dec 61-1 Dec 62.
1 Dec 62, 13p.
(Contract Nonr-47724, Proj. NR 307 252)
Unclassified report

DESCRIPTORS: *Ice islands, *Weather forecasting, Sea water, Ice, Crystals, Weather stations, Micrometeorology, Arctic regions.

Investigations conducted by the Department of Atmospheric Sciences of the University of Washington for the year 1 December 1961 to 1 December 1962 are reported. The investigations were carried out on drifting station ARLIS II, the Arctic Research Laboratory at Barrow, Alaska, and on the campus of the University of Washington. Special field work was conducted on the USCGC NORTHWIND and the Arctic Research Laboratory cruiser, NATCHIK. This report shows the progress made on the programs in micrometeorology, carbon dioxide measurements, sea ice physics, energy transfer from open sea water to cold air, and soil temperatures. (Author)

AD-290 242 Div. 2
(TISTP/JW) OTS price $6.60

Washington U., Seattle.
DETAILED ANALYSES OF SELECTED PACIFIC STORMS BASED ON CONTINUOUS RADAR RECORDS AND SHORT-INTERVAL SERIAL ASCENTS. VOLUME V. CASE OF JUNE 5-7, 1961,
by Richard J. Reed. July 62, 55p. incl. illus. tables (Technical rept. no. 7)
(Contract AF 19(604)5192, Proj. 8641)
(AFCRL 62-469) Unclassified report

DESCRIPTORS: *Storms, *Radiosondes, Pacific ocean, Meteorological data, Radar plotting, Radar echo areas, Air mass analysis.

Data and analyses are presented for the fifth and final case in the program of special radiosonde ascents. Included are original radiosonde records, pilot reports, continuous radarscope photographs, surface and upper-level analyses, and the Seattle time section for the period 5-7 June 1961. The radar echoes for this case showed three distinct phases which at first sight did not appear to be related to the synoptic pattern. Re-examination of the synoptic charts revealed, however, that the original analyses were incorrect. Instead of a single frontal passage with this storm, as originally analyzed, there were actually two. Both fronts had been present at an earlier date (3 June), but had subsequently been merged into one on the official history. The radar records, however, clearly showed that each front had maintained its identity, the echo pattern between the frontal passages being of distinctly different character than the patterns at the times of passage. This case also provided an excellent example of the manner in which cold or occluded fronts move inland during the warm season. Stable, maritime air remains lodged against the windward slopes of the mountains, while cooler air moves inland aloft. Upon passing the crest of the mountain range, the cooler air mixes to the surface in the relatively unstable air on the lee side. Thus the front reaches the interior valleys well before there is any change of surface air mass in the coastal valleys. (Author)

AD-290 252 Div. 2, 25
(TISTP/JW) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC AND UNDERWATER ACOUSTICS RESEARCH.
Semi-annual status rept., 1 Nov 61-30 Apr 62,
by Paul M. Fye. Sep 62, 23p. incl. illus.
(Reference no. 62-15)
(Contracts Nonr-136700 and Nonr-212900, Proj. nos. 261-102 and 261-104)
Unclassified report

DESCRIPTORS: *Ocean currents, Sound transmission, Seismic waves, Thermionic emission, Measurement, Underwater, Acoustics, Mediterranean Sea.

This is a status report for the six-month's period indicated. It includes the closing phase of a long cruise of CHAIN to the Mediterranean Sea during which circulation of the waters of the eastern Mediterranean were studied and sound transmission, seismic reflection, and shallow thermal structure measurements were made at various places in the Mediterranean and the North Atlantic. During the remainder of the period various geophysical, geological, and hydro-acoustical analyses were conducted at Woods Hole and preparations for the summer cruising season were made. (Author)

AD-290 265 Div. 2
(TISTP/JW) OTS price $1.60

Geophysical Inst., U. of Alaska, College.
HIGH LATITUDE GEOPHYSICAL DATA (FOR JULY-SEPTEMBER 1962).
Nov 62, 5p. incl. illus. 4 refs. (Rept. no. UAG-C-29)
Unclassified report

DESCRIPTORS: *Geophysics, Earth, Electric currents, Extraterrestrial radio waves, Attenuation, Ionosphere, Terrestrial magnetism, Data, Tables, Alaska.

AD-290 268 Div. 2
(TISTP/FR) OTS price $1.60

Geophysical Inst., U. of Alaska, College.
HIGH LATITUDE GEOPHYSICAL DATA APRIL-JUNE 1962.
July 62, 12p. incl. tables (Rept. no. UAG-C 28)
Unclassified report

DESCRIPTORS: *Geophysics, Earth, Electric currents, Extraterrestrial radio waves, Attenuation, Ionosphere, Terrestrial magnetism, Diurnal variations, Periodic variations, Data, Tables.

AD-290 269 Div. 2
(TISTP/FR) OTS price $1.10

Geophysical Inst., U. of Alaska, College.
BIBLIOGRAPHY OF PUBLICATIONS. SUPPLEMENT 2.
Dec 62, 5p.
Unclassified report

DESCRIPTORS: *Geophysics, Bibliography.

All the publications of the Geophysical Institute subsequent to the previous supplement published in December, 1961 are listed. The publications are divided into three sections: (1) Reprint Series A and B, (2) High Latitude Geophysical Data, Series UAG-C, and (3) Reports of the Geophysical Institute, Series UAG-R. In each of these series the new publications continue the sequence previously established. Reprints are those of publications that appear in Scientific Journals; Series A includes reprints of regular size, and Series B those of larger size. Series UAG-C provides numerical data, with explanatory notes, of High Latitude Geophysical Phenomena. Report Series UAG-R consists of scientific reports issued by the Geophysical Institute either in the (consecutively numbered) series of the Geophysical Research Reports or in the form of reports pertaining to various contracts. (Author)

AD-290 270 Div. 2
(TISTP/FR) OTS price $8.10

Geophysical Inst., U. of Alaska, College.
ENVIRONMENTAL STUDIES FOR RADAR OPERATIONS IN THE AURORAL ZONE, PART I.
Final rept.,
by Warren L. Flock. Oct 62, 61p. incl. illus. 45 refs.
(Subcontract to Radio Corp. of America, Moorestown, N. J., Contract AF 04(647)179)
Unclassified report

DESCRIPTORS: *Aurorae, Radio waves, Radar, Very high frequency, Earth, Electric currents, Ionosphere, Ionization, Scattering, Reflection, Instrumentation, Recording systems.

The relation between VHF radio aurora and geomagnetic activity, as indicated by telluric current records, were investigated. VHF radio aurora, observed over Barrow, Alaska by a 41-mc radar at Kotzebue, Alaska, and telluric current activity at Barrow show a high correlation, particularly with respect to onsets of major activity. Slight or moderate activity usually gives some forewarning of intense activity, but some disturbances have extremely abrupt onsets of intense activity. The correlation is clearly highest for overhead and nearly overhead radio aurora and drops off for separations of 300 km and more. (Author)

AD-290 307 Div. 2
(TISTP/FR) OTS price $3.60

Space Sciences Lab., U. of Calif., Berkeley.
ON THE ORIGIN OF MICROPULSATIONS,
by Stanley H. Ward. 1962, 17p. illus. refs.
(Series no. 3, Issue no. 27)
(Contract Nonr-22289)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, Earth, Electric currents, Upper atmosphere, Statistical analysis.

A unifying theory of the origin of micropulsations that depends for its acceptance on cavity resonances of hydromagnetic waves is presented. Following recent developments in the literature, two cavities are postulated. The outer cavity is bounded by the magnetospheric surface and the Alfven wave velocity inversion at a height of about 2000 km. The inner cavity is bounded by Alfven wave velocity inversion at 2000 km and the top of the ionosphere. The Q of either cavity is postulated to be longitude dependent, being influenced by the diurnal variation in the absorption of the walls. Alternatively, the efficiency of the mechanism for transferring energy from the solar plasma to the magnetosphere may be longitude dependent. In either event damped oscillations occur in the daytime hemisphere. Triggering of cavity oscillations in the daytime hemisphere may be achieved through minor random fluctuations in the solar plasma. In contrast, a marked step function increase in solar plasma velocity is considered necessary to trigger oscillations in the nighttime hemisphere. The basic excitation for all pulsations is GMT dependent, but the efficiency of the triggering mechanism is LMT dependent. (Author)

AD-290 308 Div. 2
(TISTP/FR) OTS price $8.60

Hydraulic Engineering Lab., U. of Calif., Berkeley.
SAND MOVEMENT BY WIND,
by Pierre-Yves Belly. July 62, 91p. incl. illus. tables, 8 refs. (Series no. 72, Issue no. 7)
(Contract DA 49-055-eng-17)
Unclassified report

DESCRIPTORS: *Sand, Motion, Velocity, Wind, Statistical analysis.

AD-290 314 Div. 2
(TISTP/FR) OTS price $3.60

Woods Hole Oceanographic Institution, Mass.
JOURNAL OF CHAIN CRUISE #19, JUNE-JULY 1961.
by J. B. Hersey. Oct 62, 28p. incl. illus. 2 refs. (Ref. no. 62-35)
(Contract Nonr-136700, Proj. NR 261-102)
Unclassified report

DESCRIPTORS: *Oceanography, Oceans, Depth finding, Ocean bottom, Sedimentation, Sampling, Photographic analysis, Heat, Measurement, Instrumentation, Oceanographic vessels, Atlantic Ocean.

A journal of CHAIN Cruise 19 is presented. Included are a summary of data, summary track charts, and the cruise plan. This was a cruise to the Puerto Rico Trench between 13 June and 7 July 1961. The scientific program included a short study (40-50 miles) south of Bermuda and an intensive study of the north wall of the Puerto Rico Trench. The scientific program included echo sounding, dredging, continuous seismic profiling (reflection) and bottom photography and heat flow measurements. (Author)

AD-290 319 Div. 2
(TISTP/FR) OTS price $7.60

Oregon State U., Corvallis.
HYDROGRAPHIC DATA FROM OREGON COASTAL WATERS JUNE 1960 - MAY 1961,
by Bruce Wyatt and Norman F. Kujala, ed. by Elizabeth Strong. Apr 62, 77p. incl. illus. 4 refs. (Data rept. no. 7, Ref. no. 62-6)
(Contract Nonr-128602, Proj. Nr. 083-102)
Unclassified report

DESCRIPTORS: *Hydrographic surveying, Oceans, Depth finding, Temperature, Salinity, Oxygen, Ocean currents, Measurement, Pacific Ocean.

AD-290 399 Div. 2
(TISTP/FR) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
THE LANGUAGE OF HAILSTORMS AND HAILSTONES,
by Helmut K. Weickmann. May 62, 44p. incl. illus. tables, 44 refs. (USASRDL Technical rept. no. 2277)
Unclassified report

DESCRIPTORS: *Hail, *Storms, Convection, Clouds, Water, Wind.

The basic ingredients of hailstorms such as height of storm, infrared cooling of the upper parts of the anvil, structure and properties of the updrafts, influence of glaciation and water storage on the buoyancy, and the over-all air consumption in a hailstorm are discussed. Some fundamental differences between symmetrical and asymmetrical storms are related, with special consideration of the mechanism and of the consequences of shearing off the upper parts of a storm in a strong wind shear or jet stream. Certain properties of hailstones--their shape and internal structure--which may serve as clues to their life history in the storm are considered. (Author)

AD-290 466 Div. 2, 30
(TISTB/MS) OTS price $2.60

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
TESTS AND EVALUATION AND AUTOMATIC POINT READING, PLOTTING, AND GRID RULING MACHINE.
Technical rept. no. 8-TR, Apr 61-Jan 62,
by Homer C. Babcock. 17 Aug 62, 24p. incl. illus. table.
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, *Plotters, Position finding, Data processing systems, Test equipment, Automatic.

Engineering and operational tests were conducted to determine the suitability of an automatic point reading, plotting, and grid ruling machine for Army field use. This machine is designed to automatically prepare grid networks and plot control data for the preparation of topographic maps. It can also be used as a point coordinate reader for scanning photomosaics to obtain relative location data. The report concludes that automatic point plotters of this type, utilizing digital control principles and precision ball screw drive mechanisms, are: (a) capable of plotting and drafting with accuracy equal to that obtained with manual coordinatographs at a rate of speed much greater than that obtained with the manual instruments, (b) capable of effecting a significant saving of time and manpower in the preparation of grids and plotting of control data when operating from manual input as well as from tape input, (c) suitable for use in reading coordinates of points from photomosaics, etc., for use in positioning systems, and (d) sufficiently reliable for military use. (Author)

AD-290 501 Div. 2
(TISTP/TL) OTS price $3.60

White Sands Missile Range, N. Mex.
WIND SHEAR IN THE JET STREAM AT WHITE SANDS MISSILE RANGE,
by Manuel Armendariz, Emmit Fisher and Juana Serna. Nov 62, 26p. incl. illus. 9 refs. (Rept. no. SELWS-M-13)
Unclassified report

DESCRIPTORS: *Jet streams (Meteorology). *Wind, *Shear stresses, New Mexico, Meteorology.

A discussion of wind shear in the jet stream over White Sands Missile Range, New Mexico is presented. Wind data collected utilizing the GMD-1 system are used to calculate vectorial wind shear. The maximum jet wind speed could not be significantly correlated to the maximum wind shear for any particular observation. Mean vectorial wind shear and standard deviation for each thousand feet of height in the jet stream are included. (Author)

AD-290 516 Div. 2
(TISTP/TL) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON THE EXISTENCE AND UNIQUENESS OF INTRINSIC ENERGY IN GENERAL RELATIVITY,
by Dominic G. B. Edelen. Nov 62, 18p. (Research memo. no. RM-3379-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Celestial mechanics, *Relativity theory, Energy, Tensor analysis, Vector analysis, Gravity, Density, Bodies of revolution, Motion, Matrix algebra, Differential equations, Integration.

It is shown that the Einstein field equations uniquely determine an intrinsic energy density in any region of space-time which is occupied by a material medium. The usual procedure of adding conditions to the Einstein theory in order to obtain an analogous intrinsic quantity is thus unnecessary. (Author)

AD-290 521 Div. 2
(TISTP/JW) OTS price $10.10

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
AMC CLIMATOLOGICAL RINGBOOK. PART XXVII. EMPIRICAL FREQUENCY DISTRIBUTIONS OF WIND COMPONENTS AT CONSTANT ALTITUDE LEVELS, SILVERHILL, MARYLAND,
by Werner H. Alfuth and Armstead P. Alsobrook. 13 Nov 61, 121p. incl. tables (Rept. no. RR-TR-61-31)
Unclassified report

DESCRIPTORS: *Wind, *Climatic factors, Frequency, Distribution, Meteorological data, Reliability, Tables, Maryland.

Climatological parameters of scalar winds, zonal and meridional wind components, semiplanar winds and wind shear at 1 km altitude intervals for Silverhill, Maryland are presented. The

frequency distributions have been established for the twelve monthly and the annual reference periods with values of cumulative percentage frequency corresponding to the mean and plus and minus one, two and three sigma levels of normal distribution. The statistical information is based on the observational period 1951 - 1957. (Author)

AD-290 529 Div. 2
(TISTP/FR) OTS price $7.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
OPERATION SWAMP FOX I TERRAIN AND SOIL TRAFFICABILITY OBSERVATIONS,
by B. G. Schreiner and A. A. Rula. Aug 62, 73p. incl. illus. tables (Technical rept. no. 3-609)
Unclassified report

DESCRIPTORS: *Trafficability, *Soils, *Vehicles, *Terrain, *Tropical regions, Panama, Plants, Moisture, Cargo vehicles, Tracked vehicles, Army operations.

During the period of 21 August to 1 October 1961, the U. S. Army Transportation Corps conducted Operation Swamp Fox I in Panama. It was concluded that gullies, rivers, vegetation, slope, and wet surface-soil conditions were significant obstacles to vehicle movement. Because of difficult going conditions for conventional wheeled vehicles, they had to be dropped from the operation early in the program. The steep slopes appeared to present the greatest problem because of their frequency of occurrence. Vegetation effects were minimized by removing sufficient trees and underbrush from the trail to permit vehicles to pass without great difficulty. The use of structural diagrams proved to be a quick objective method for describing vegetation. In general, the soils encountered during the operation were strong enough to support the vehicles used in the operation. On the basis of the limited traffic tests conducted, it appears that the instruments and techniques used to determine the trafficability characteristics of fine-grained soils in humid-temperate climates are adequate for the determination of trafficability of tropical soils in Panama. Further testing is recommended. (Author)

AD-290 565 Div. 2
(TISTP/JW) OTS price $1.10

Kansas U., Lawrence.
THE ROLE OF LANDSLIDES IN SLOPE DEVELOPMENT IN THE HIGH RAINFALL TROPICS.
Annual summary rept. of Scientific Progress, 1 Dec 61-9 Nov 62,
by David S. Simonett. 9 Nov 62, 5p.
(Contract Nonr-58311, Proj. NR 389-133)
Unclassified report

DESCRIPTORS: *Earth, *Topology, Slides, Aerial photographs, Mapping, Precipitation, Erosion, Motion, New Guinea.

The year was devoted primarily to field work (5 months in New Guinea) and to the acquisition of air photographs of World War II vintage and post-war verticals of New Guinea, contour, geological and other maps and publications preparatory to intensive photo interpretation and statistical and laboratory studies. (Author)

AD-290 613 Div. 2
(TISTP/FR) OTS price $3.60

Bern U. (Switzerland).
RADIATION EFFECTS IN SPACE AND THERMAL EFFECTS OF ATMOSPHERIC ENTRY BY THERMOLUMINESCENCE MEASUREMENTS ON METEORITES.
Technical rept.,
by F. G. Houtermans. 1 Oct 62, 24p. illus. refs.
(AF EOAR Grant 61-51)
Unclassified report

DESCRIPTORS: *Meteorites, *Luminescence, Heating, Beta particles, Measurement.

The natural glow-curves of ten chondrites were measured and compared with the corresponding artificial glow-curves, obtained after irradiation with a beta-dose of 50,000 rad. The differences between the natural and the artificial glow-curves as well as the increase of peak-temperature with decreasing peak-intensity, observed for the natural glow-curves of the various chondrites, can be explained by thermal effects. Either a temperature raise occurred before, during, or after the fall of the meteorites, which caused the low-temperature part of the natural glow-curves to fade out, or the shallow, low-energy traps, responsible for the low-temperature part of the natural glow-curves never were filled, due to the low dose rate of cosmic radiation. (Author)

AD-290 636 Div. 2, 25
(TISTW/RD) OTS price $19.75

Westinghouse Electric Corp., Baltimore, Md.
INVESTIGATION OF OPTICS FOR A RADIATION WEAPON SYSTEM. VOLUME II.
Quarterly technical note no. 2.
1 Aug 62, 1v. incl. illus. tables, 42 refs.
(Contract AF 30(602)2638)
(RADC TDR 62-421, vol. 2)
Unclassified report

DESCRIPTORS: *Meteorological data, *Light transmission, *Fire control systems, Clouds, Diurnal variations, Fog, Smokes, Haze, Particles, Atmosphere, Visibility, Atmospheric refraction, Refractive index, Microwaves, Maryland, Errors.

This report includes:
ATMOSPHERIC PARTICLE STATISTICS, by L. C. Van Allen. 14 June 62, 92p. incl. illus. tables, 106 refs. (Rept. no. NL-170)

ERROR ANALYSIS OF A FIRE CONTROL SYSTEM, by D. S. Doeg. 1 Aug 62, 17p. incl. illus. 3 refs. (Rept. no. NL-176)

MICROWAVE REFRACTIVE EFFECTS, by R. A. Freibrun. 30 July 62, 63p. incl. illus. 24 refs. (Rept. no. NL-174)

CLOUD DISTRIBUTION AND GROUND LEVEL VISIBILITY AT BALTIMORE, MD., by L. C. Van Allen. 16 May 62, 124p. incl. illus. tables, 15 refs. (Rept. no. NL-169)

AD-290 671 Div. 2
(TISTP/FR) OTS price $2.60

California U., Berkeley.
ON THE DISTRIBUTION OF HIGH ENERGY STARS IN SPHERICAL Stellar systems,
by Richard W. Michie. 1962, 29p. incl. illus. 9 refs.
(Contract AF 49(638)299)
Unclassified report

DESCRIPTORS: *Stars, *Energy, *Statistical functions, Equations.

A distribution function f(r,v,u;t) for isolated spherical stellar systems is obtained from the Boltzmann equation with encounters described by the Fokker-Planck equation. The distribution function is believed to correspond rather closely to actual stellar systems since it is obtained from the Boltzmann equation, the potential is obtained from Poisson's equation, and the stellar orbits are not assumed to be isotropic everywhere but rather are more radial at greater distances from the center. The importance of a careful analysis in the region of phase space at and near the energy of escape is emphasized. In this region, it is shown that the velocity space flux vector is constant, and it is this constancy which allows a solution for f. The distribution of high energy stars is depopulated for (1) those stars whose mass is small compared to the average stellar mass, (2) regions close to the center of the system, and (3) large values of the model parameter C. It is proposed that the method of analysis presented may be used for obtaining a distribution function for rotating stellar systems. (Author)

AD-290 672 Div. 2
(TISTP/FR) OTS price $1.60

California U., Berkeley.
INTERPLANETARY GAS. VII. A SEMI-EMPIRICAL MODEL,
by John C. Brandt and Richard W. Michie.
19 Feb 62, rev. 6 Apr 62, 18p. incl. illus.
21 refs.
(Contract AF 49(638)299)
Unclassified report

DESCRIPTORS: *Solar corona, *Particles, *Gases, Magnetic fields, Temperature.

A theoretical expression is obtained connecting parameters in the solar wind near the orbit of earth with parameters in the inner corona. A model similar to the empirical model presented recently (Brandt 1962) is found to be reasonably consistent with the theoretical expression. Near the orbit of earth, an expansion velocity of 200-400 km/sec and a mean electron density of 1-5/cc are thought to be probable. (Author)

AD-290 734 Div. 2
(TISTP/FR) OTS price $11.00

Indiana U., Bloomington.
TEMPERATURE CHANGE WITH ELEVATION IN BURMA,
by Robert E. Huke, ed. by Don C. Bennett.
July 62, 143p. incl. illus. tables, 21 refs.
(Contract DA 19-129-qm-1582, Proj. 7-83-01-006)
Unclassified report

DESCRIPTORS: *Temperature, Periodic variations, Terrain, Weather stations, Burma.

A study was made of temperature conditions and the relationship of temperature to elevation along two profiles across the Shan escarpment and in the western Shan mountains. Data were obtained from temporary weather stations and from Burma Government permanent stations. Data were analyzed for mean and absolute maximum and minimum temperatures, lapse rates, temperature ranges and seasonal fluctuations.

AD-290 735 Div. 2
(TISTP/FR) OTS price $11.50

Indiana U., Bloomington.
THE RAINFALL OF THAILAND,
by Lawrence Sternstein, ed. Don C. Bennett.
15 Aug 62, 149p. incl. illus. tables, 21 refs.
(Contract DA 19-129-qm-1582, Proj. 7-83-01-006)
Unclassified report

DESCRIPTORS: *Precipitation, Diurnal variations, Periodic variations, Thailand.

A description and analysis of rainfall characteristics in Thailand is given which is concerned with the annual, monthly, daily, and hourly rainfall patterns as well as with the intensity, duration, spacing, and variation of the precipitation. Rainfall regions are identified. All known rainfall data are summarized and evaluated.

AD-290 736 Div. 2
(TISTP/FR) OTS price $8.60

Indiana U., Bloomington.
HIGH VELOCITY WINDS IN THE PHILIPPINES,
by Thomas E. Thorp, ed. by Don C. Bennett.
15 Aug 62, 86p. incl. illus. tables, 28 refs.
(Contract DA 19-129-qm-1582)
Unclassified report

DESCRIPTORS: *Wind, Tropical cyclones, Periodic variaions, Measurement, Weather stations, Philippine Islands.

Examination was made of high velocity winds (30 m.p.h. and over) in the Philippine Islands, including a description and analysis of wind velocities, duration, frequency, seasonality, and areas of occurrence. Study of their relationship to typhoons and tropical cyclones was also made. Evaluation of wind data available and the present data collecting network in the Philippines are given.

AD-290 811 Div. 2
(TISTP/FR) OTS price $2.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 29 for Sep 62.
19 Nov 62, 23p. incl. illus. (AID rept. no. 62-187)
Unclassified report

DESCRIPTORS: *Geophysics, Radio waves, Absorption, Ionosphere, Solar flares, Terrestrial magnetism, Magnetic fields, Solar atmosphere, Extraterrestrial radio waves, Solar corona, Aurorae, Electric currents, Upper atmosphere, Electrons, Solar energy, Cosmic rays, Neutrons, Precipitation, Atmosphere, Ozone, Bibliography.

Abstracts of 21 Soviet journal articles on various subjects in geophysics and astronomy are presented.

AD-290 817 Div. 2
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
EFFECT OF THE EARTH'S ROTATION ON ATMOSPHERIC AND HYDROSPHERIC PROCESSES.
13 Nov 62, 3p. incl. 1 table (AID rept. no. 62-175; Trans. from Sidorenkov, N. S. Effect of the non-uniform rotation of the earth on atmospheric and hydrospheric processes. IN: Arkticheskiy i Antarkticheskiy nauchno-issledovatel'skiy institut. Leningrad, Izd-vo Morskoy transport pp. 45-49, 1961)
Unclassified report

DESCRIPTORS: *Earth, Rotation, Atmosphere, Oceans.

AD-290 835 Div. 2
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DOWNFALL OF A LEGEND. DOES COSMIC COLD EXIST,
by Yuriy Moralevich. 11 Oct 62, 4p. (Trans. no. FTD-TT-62-1403 from Zaraya Vostoka 41, 182, 4p., 5 Aug 62)
Unclassified report

DESCRIPTORS: *Interstellar matter, Heating, Cooling.

AD-290 839 Div. 2
(TISTP/FR) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF MAGNETIC FIELDS ASSOCIATED WITH SOLAR FLARES,
by A. B. Severnyy. 8 Oct 62, 45p. incl. illus. tables, 10 refs. (Trans. no. FTD-TT-62-99 from Izvestiya Kryzskoy Astrofizicheskoy Observatorii 22:pp. 12-41, 1960)
Unclassified report

DESCRIPTORS: *Solar flares, Magnetic fields.

The occurrence of flares at neutral points in a field and the destruction by the flares of the magnetic fields surrounding these points are discussed. By means of a substantially improved solar magnetograph 20 recordings of magnetic fields of active groups were obtained; of these, 8 yield data only on the position of the flares, whereas 12 make it possible, in addition, to draw conclusions with regard to changes in the fields on the occurrence of flares. The fields were recorded in the lambda 4886 (Fe I) line and sometimes in lambda 4886 and H sub beta. (Author)

AD-291 148 Div. 2, 30
(TISTP/WH) OTS price $3.60

United Electrodynamics, Pasadena, Calif.
TONTO FOREST SEISMOLOGICAL OBSERVATORY.
Semiannual rept. no. 1, 1 Jan-1 June 62 on Experimental Seismographic Station.
1 June 62, 1v. incl. illus. 28 refs.
(Contract AF 33(657)7747)
Unclassified report

DESCRIPTORS: *Seismological stations, Arizona.

AD-291 150 Div. 2, 20
(TISTW/RD) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
PROJECT SAN ANDREAS AFTERSHOCK RECORDING.
Final rept.,
by W. H. Westphal. 30 June 62, 30p. incl. illus. tables, 19 refs.
(Contract AF 49(638)1071)
Unclassified report

DESCRIPTORS: *Earthquakes, *Underground explosions, *Nuclear explosions, Seismographs, Shock waves, Blast, Monitors.

Aftershock sequences were measured from ten earthquakes between June 1960 and September 1961 with the objective of evaluating aftershock monitoring as an on-site inspection technique. To be of value for on-site inspection, aftershock monitoring must be able to distinguish between the aftershocks of an earthquake and those of an underground explosion. Particularly useful aftershocks for on-site inspection are believed at present to be (1) those of sufficient magnitude to be detected at distances of 8 km or more (over a 200 km/sq area) from the source of the primary event, (2) those from a magnitude 4 to 6 primary event, and finally (3) those which occur at least four days after the primary event. (Author)

AD-291 170 Div. 2
(TISTP/WH) OTS price $4.60

Weather Bureau, Washington, D. C.
STUDIES ON THE METEOROLOGY OF GREENLAND.
Interim rept. no. 1, 15 Dec 61-15 June 62,
by W. L. Schallert. 15 June 62, 43p. incl. illus. tables, 8 refs.
(DA Proj. 3A99-27-005)
Unclassified report

DESCRIPTORS: *Meteorology, *Diurnal variations, *Pressure, *Temperature, *Wind, Greenland, Atmosphere.

The monthly mean diurnal variations of pressure, temperature, and wind are examined for the period May 1960-April 1961. Harmonic components of the pressure and temperature oscillation are compared with similar studies for stations in the Alps and Rocky Mountains and on the slopes of Mount Fuji in Japan. Variations in the Thule area are considerably less regular than at other locations examined and appear to be, at least in part, a consequence of the meteorological regime of the area. (Author)

AD-291 185 Div. 2, 6
(TISTW/RD) OTS price $9.60

Marine Lab., U. of Miami, Coral Gables, Fla.
RADAR HURRICANE RESEARCH.
Final rept., 1 July 61-30 June 62,
by H. V. Senn, H. W. Hiser and J. A Stevens.
Sep 62, 109p. incl. illus. tables, 18 refs.
(Rept. nos. 8982; ML 62361)
(Contract Cwb-10198)
Unclassified report

DESCRIPTORS: *Meteorological radar, *Hurricanes, *Radar echo areas, Search radar, Airborne, Radar reflections, Sea water.

The small scale motion of the radar hurricane center is examined for hurricanes Ione 1955, Helene 1958, Debra 1959, Donna 1960 and Carla 1961 in an attempt to show the relationship between such motion and that which is actually reported and used operationally. Significantly large and sometimes systematic variations in both the speed and direction of the radar eye exist when observed on either a five minute or one-half hour time base for all the storms studied. Echo vectors relative to the storm center, obtained by vectorially subtracting small scale eye motion or mean storm motion for longer periods, are presented for 3805 traced echoes from hurricane Donna radar film. In addition, distributions of crossing angle, and total, radial, and tangential echo motion components are presented for various storm speeds, quadrants and ranges from the storm center. These data are compared with similar data from earlier storms. Hurricane echo lifetimes and diameters are discussed; theoretical and observed ranges of sea return for the APS-20E airborne radar are given; an and explanation is offered for a serious radar distortion in the shape of the eye of hurricane Esther during a 1961 flight. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-290 527 Div. 3, 2
(TISTP/TL) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
(No title).
Monthly progress letter rept.,
by Alvin N. Bird, Jr. 8 Dec 62, 4p.
(Contract DA 18-108-AMC-32-A)
Unclassified report

DESCRIPTORS: *Chemical warfare agents, *Atmosphere, *Particles, Scattering, Meteorology, Sampling, Aerosols, Electrochemistry, High intensity flash lamps, Detection, Distribution, Measurement.

The design study to develop techniques for measuring concentration and particle size distribution of chemical agents was continued during November 1962. The effect of meteorology on sampling, the aerosol flashcamera scheme, and the improvement of the sensitivity and response time of the electrochemical detector were studied. (Author)

4. CHEMISTRY

AD-289 813 Div. 4, 25
(TISTM/RGR) OTS price $3.00

Johnston, William H. Labs., Inc., Baltimore, Md.
THEORETICAL STUDIES IN BASIC RADIATION CHEMISTRY.
Final technical rept., 14 Oct 60-15 Aug 62 on Chemical Research on Matter,
by M. Vestal, A. L. Wahrhaftig, and W. H. Johnston. Sep 62, 180p. incl. illus. tables, 40 refs.
(Contract AF 33(616)7638, Proj. 7023)
(ARL 62-426) Unclassified report

DESCRIPTORS: *Radiation effects, *Butanes, *Propanes, Excitation, Chemical reactions, Gases, Gas ionization, Special functions, Electrons, Theory, Ions, Molecules, Computer logic, Statistical functions, Chemistry, Aliphatic compounds.

Studies were concerned with the problem of specifying the distribution of excited ions and molecules formed in gas phase radiation chemical systems. The principle emphasis was placed on developing and improving a satisfactory theory of the unimolecular reactions of excited polyatomic molecule-ions; establishing the validity of the theory by comparing calculated results with published experimental data; and extending the theory for application to radiation chemistry. Consideration was also given to the problem of specifying the electron energy distribution producing the excitation and ionization in an irradiated gas phase system. Theoretical results are presented for propane, n-butane, and iso-butane. (Author)

AD-289 888 Div. 4
(TISTM/ODN) OTS price $.50

Clemson Agricultural Coll., S. C.
ORDERING IN OXIDE SOLID SOLUTIONS.
Rept. for May 61-Apr 62 on Research on Interface Phenomena,
by H. H. Wilson. Oct 62, 10p. incl. illus. table, 5 refs.
(Contract AF 33(616)6870, Proj. 7350)
(ASD TR 61-92, pt. 2) Unclassified report

DESCRIPTORS: *Oxides, *Magnesium compounds, Lattices, Manganese compounds, Iron compounds, Cobalt compounds, Oxygen, Metallic crystals, Ions, Controlled atmospheres, X-ray diffraction analysis, Heat treatment.

A study was made of solid solutions of MgO with Mn-, Fe-, and Co oxides to determine the effect of extended heat treatment and of controlled furnace atmospheres on the formation of superlattices. Heat treatments involving temperatures up to 1350 C and times up to 600 hours were used. Furnace atmospheres were controlled so as to be either neutral, slightly oxidizing, or slightly reducing with respect to the divalent metallic ions. Indications of ordering were found in those compositions that were heated in reducing atmospheres. A broad diffraction peak was found at 6.4 Angstroms which is three times the (002) spacing of the unordered lattices. (Author)

AD-290 258 Div. 4, 10
(TISTM/TCG) OTS price $1.10

Ohio State U., Research Foundation, Columbus.
THE MECHANISM OF OXIDE FORMATION IN THE INITIAL STAGES OF OXIDATION.
Quarterly rept. no. 9, 1 July-30 Sep 62,
by D. W. Rausch, K. L. Moazed and M. G. Fontana. 14 Nov 62, 7p. incl. illus. 2 refs.
(Contract DA 33-019-ORD-3387)
Unclassified report

DESCRIPTORS: *Oxides, *Oxidation, *Combustion, *Oxygen, Field emission, Low pressure research, Tantalum, Tungsten, Electrolytic polishing, Thermal radiation, Vacuum systems, Gases, Cleaning, High temperature research, Synthesis, Theory, Chemical reactions.

Work comprised field emission experiments in which O at pressures between 10 to the -10th and 10 to the -4th power mm Hg was reacted with clean W and Ta substrates at temperatures between 25 and 2000C. The random nucleation of a distinct second phase was observed on tantalum at 830 and 1135C. Marked differences between the course of reaction of O on W and of O on Ta are becoming apparent. Considerable difficulty was encountered in developing a reproducible technique for the cleaning of Ta emitter-substrates. The most recent method developed, however, did produce a clean tantalum emission pattern very readily without the use of field evaporation. (Author)

AD-290 344 Div. 4
(TISTM/TCG) OTS price $1.60

Colorado U., Boulder.
RUBBER RESEARCH. THE SYNTHESIS OF SPECIAL FLUORINE-CONTAINING MONOMERS.
Quarterly progress rept. no. 4, 1 July-1 Oct 62,
by J. D. Park and J. R. Lacher. 12 Oct 62, 11p.
(Contracts DA 19-129-qm-1926 and DA 19-129-qm-1263)
Unclassified report

DESCRIPTORS: *Fluorocarbons, *Glutaric acids, *Nitrites, Acetyl radicals, Fluorides, Methanes, Iodine compounds, Nitro radicals, Chemical reactions, Synthesis, Ethylenes, Silver compounds, Lithium compounds, Pyrolysis, Cyclobutanes, Imides.

Disilver perfluoroglutarate was prepared from the diamide. From N_2O_3 and trifluoroacetic anhydride, trifluoroacetyl nitrite was prepared. The decomposition of trifluoroacetyl nitrite in the presence of I gave trifluoroiodomethane. A new and improved synthesis leading towards dinitrosoperfluoroalkanes is in progress. A new liquid phase system for the addition of NOCl to fluoroolefins was developed. It comprises the addition of ICl to LiF in dimethyl formamide. The preparation of CF_3I from the reaction of CF_3COONO and I2 was carried out to test the feasibility of this method as a preparative method for CF_3I. (Author)

AD-290 631 Div. 4
(TISTM/ODN) OTS price $1.60

Oxford U. (Gt. Brit.).
THE REACTION OF ATOMS AND RADICALS WITH VARIOUS MOLECULES AND WITH ONE - ANOTHER.
Technical rept.,
by J. W. Linnett. 29 Oct 62, 15p. 15 refs.
(AF EOAR Grant 62-6)
Unclassified report

DESCRIPTORS: *Inorganic substances, *Atoms, *Recombination reactions, Theory, Oxygen, Oxides, Metals, Alloys, Gold alloys, Palladium alloys, Surfaces, Lithium compounds, Chromium compounds, Radiofrequency, Hydrogen, Lithium, Gases.

The report is divided into five sections as follows: (A) Recombination of oxygen atoms in the gas phase, (B) Recombination of atoms at oxide surfaces, (C) Attack of metals by atoms, (D) Recombination of atoms on Pd:Au alloys, and (E) New methods for studying recombination coefficients. (Author)

AD-290 676 Div. 4, 25
(TISTM/EJH) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
INFLUENCE OF PRESSURE ON PERIODIC PROPERTIES OF ELEMENTS,
by Yu. N. Ryabinin. July 62, 7p. incl. illus. 9 refs. (Trans. no. ETRR 62-34)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Chemical elements, *High pressure research, *Alkali metals, *Alkaline earth metals, Atomic number, Volume, Physical properties, Quantum mechanics, Barium, Cesium, Calcium, Potassium, Rubidium, Strontium, Atoms, Mathematical analysis, Translations, USSR.

AD-290 677 Div. 4, 25
(TISTM/EJH) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
DEPENDENCE OF THE COMPRESSIBILITY OF ELEMENTS ON THE ATOMIC NUMBER,
by L. F. Vereshchagin and A. I. Lichter, tr.
by Zanis Stuberovskis. July 62, 6p. 14 refs.
(Trans. no. ETRR 62-33)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Chemical elements, *High pressure research, *Alkali metals, *Alkaline earth metals, Mathematical analysis, Volume, Physical properties, Quantum mechanics, Atomic number, Barium, Cesium, Cerium, Calcium, Phase transitions, Atoms, Potassium, Rubidium, Strontium, Translations, USSR.

AD-290 743 Div. 4
(TISTM/TCG) OTS price $3.60

Queen's U., Belfast (Gt. Brit.).
ORGANOSULPHUR CHEMISTRY.
Annual technical rept. for 1 Oct 61-30 Sep 62,
by H. B. Henbest. 30 Sep 62, 33p. incl. illus. tables, 19 refs.
(Contract DA 91-591-EUC-1801)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Sulfur compounds, *Thiocyanates, Organic compounds, Amides, Nitrogen compounds, Chemical reactions, Phenyl radicals, Methyl radicals, Benzyl radicals, Quinones, Chlorides, Toluenes, Synthesis, Substitution reactions, Hydrolysis, Sulfides, Bromides, Thio radicals, Sulfones, Oxidation.

The effects of hetero-groups (amide and sulphonyl) in nitrogen and sulphur compounds were examined. The reaction between dimethylbenzamide, $PhCONMe_2$ and t-butoxy-radicals resulted in the formation of methylbenzamide by demethylation. The sulphonyl group had a strongly deactivating effect on adjacent C-H bond reactivity. Reactions of 3,3',5,5'-tetrachlorodiphenoquinone with anisole and with thioanisole were studied. Reactions of thiocyanogen and related compounds were studied. The triphenylmethyl compound, $CPh_3.NCS$, was converted into compounds CPH_3X by substitution reactions with anions (X = OH, I, Ph.CO.S, Me.CO.S), silver salts (X = Me.CO.O), solvents (H2O, ROH), acids (Ph.CO.SH, Me.CO.SH), and cyanogen bromide. The hydrolysis of triphenylmethyl isothiocyanate and of other compounds on columns of alumina or silica was investigated. (Author)

AD-290 773 Div. 4, 10
(TISTM/ODN) OTS price $8.60

Purdue Research Foundation, Lafayette, Ind.
RESEARCH IN NITROMONOMERS AND THEIR APPLICATION TO SOLID SMOKELESS PROPELLANTS.
Annual progress rept. no. 24, 15 Sep 61-14 Oct 62,
by Henry Feuer. 30 Nov 62, 78p. incl. tables, 55 refs.
(Contract Nonr-110013)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Nitro radicals, *Organic compounds, Nuclear Magnetic resonance, Alkyl radicals, Bibliography, Acetates, Propyl radicals, Propenes, Propanols, Methyl radicals, Butanes, Bromides, Butadienes, Pentanes, Alkoxy radicals, Titration, Ethers, Boron compounds, Chlorides, Methanes, Hexanes, Sulfides, Butyl radicals, Hydrochloric acid, Sodium compounds, Amides, Ethyl radicals, Azoles, Synthesis.

1-Nitropropene generated from 1-nitropropyl acetate reacted readily with sodium 2-propanenitronate, sodium 1-nitropropanenitronate disodium 1,6-dinitro-1,6-hexanedinitronate and disodium ethylenedinitramine to give in high yield the expected Michael adducts. 1-Nitro-2-propyl acetate underwent readily a Diels Alder reaction with cyclopentadiene to give 6-methyl-5-nitro-2-norbornene. 1-Alkoxy-2-nitroalkanes and alkyl 2-nitroalkyl sulfides were prepared by adding 2-nitroalkyl acetates to alkali alkoxides and alkylthiolates, respectively. On treatment with boron trichloride, 1-alkoxy-2-nitroalkanes were readily converted to 2-nitro-1-alkanols. 1-Alkoxy-2-alkyl-2,4-dinitroalkanes, obtained from the salts of 1-alkoxy-2-nitroalkanes and 2-nitrobutyl acetate, afforded 2-alkyl-2,4-dinitro-1-alkanols on refluxing with

boron trichloride. N,N-Dialkylamides and such as N,N-dimethylacetamide, N,N-dimethylbutanamide and N,N,N',N'-tetramethyladipamide gave the salts of the corresponding alpha-nitro compounds when subjected to alkaline alkyl nitration. Diborane is an excellent reducing agent for oximes and nitronate ions. The products of this reduction are hydroxylamines. A convenient method for determining molecular weights of salts of mononitro compounds was devised. (Author)

AD-290 774 Div. 4, 25
(TISTM/RGR) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
RATE AND MECHANISM OF PYROLYSIS OF POLYBENZYL,
by Hugh C. Anderson. 28 Sep 62, 13p. incl. illus. tables, 11 refs.
Unclassified report

DESCRIPTORS: *Benzyl radicals, *Polymers, *Pyrolysis, Thermodynamics, Chemical reactions, Chromatographic analysis, Infrared spectroscopy, Molecular structure, Phenols, Benzenes, Toluenes, Xylenes.

The thermal decomposition of polybenzyl was investigated. Polybenzyl was found to decompose with an activation energy of 45.4 Kcal/mole. Its products of decomposition comprised about 96% of substances involatile in vacuo at 25 C and 4% of a mixture of benzene, toluene and xylene. That the amount of toluene produced was four times that of benzene is attributed to the benzyl radical having a greater resonance stabilization energy than a phenyl radical. (Author)

AD-291 131 Div. 4, 14
(TISTM/TCG) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
RUBBER ELASTICITY IN HIGHLY CROSSLINKED SYSTEMS: PART II: CROSSLINKED STYRENE, METHYL METHACRYLATE, ETHYL ACRYLATE AND OCTYL ACRYLATE,
by A. V. Tobolosky, D. Katz and others. Dec 62, 8p. tables, 9 refs. (ONR Technical rept. no. RLT-54)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Synthetic rubber, *Elastomers, *Styrenes, *Acrylic resins, Polymers, Polymerization, Methyl radicals, Ethyl radicals, Octanes, Glycols, Ethylenes, Synthesis, Elasticity, Tensile properties, Mechanical properties, Equations of state, Rubber, Sheets, Physical properties.

Styrene, methyl methacrylate, and octyl acrylate were each copolymerized with tetraethylene glycol dimethacrylate over the complete range of copolymer compositions. Modulus temperature curves of these polymers were constructed and compared. The equation of state for rubber elasticity was applied to the rubbery plateau regions of these polymers. (Author)

AD-291 132 Div. 4, 14
(TISTM/TCG) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
RUBBER ELASTICITY IN HIGHLY CROSSLINKED SYSTEMS: PART I: CROSSLINKED POLYETHYL ACRYLATE,
by D. Katz and A. V. Tobolsky. Dec 62, 9p. illus. tables, 8 refs. (ONR Technical rept. no. RLT-53)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Synthetic rubber, *Elastomers, *Acrylic resins, *Formaldehyde, Polymers, Polymerization, Methyl radicals, Ethyl radicals, Phenols, Glycols, Synthesis, Elasticity, Tensile properties, Shear stresses, Mechanical properties, Physical properties, Rubber, Sheets.

Copolymers of ethyl acrylate with three different dimethacrylates were prepared over the complete range of copolymer composition. Modulus temperature curves of these polymers were constructed and contrasted with the modulus temperature curves of phenol formaldehyde type polymers. The ethyl acrylate-dimethacrylate polymers appeared to have rubbery plateau regions at high temperatures even for very high mole. percentages of dimethacrylate. The phenol formaldehyde type polymers and polyethylene glycol dimethacrylate did not appear to have rubbery plateau regions. Up to 12 mole. per cent of dimethacrylate, the shear moduli of the ethyl acrylate copolymers in the rubbery plateau region were independent of the structure of the dimethacrylate at equivalent crosslink concentrations. These polymers appear to obey the laws of ideal rubber elasticity with a front factor of unity. (Author)

5. COMMUNICATIONS

AD-289 663 Div. 5, 6, 15
(TISTE/OHD) OTS price $1.60

Numerical Analysis Research, U. of Calif., Los Angeles.
ESTIMATION OF VARIANCES FOR RADIO DIRECTION FINDING EQUIPMENT.
Technical rept.,
by W. E. Smith. Nov 62, 11p. incl. illus. 3 refs.
(Contract Nonr-23376 and Grant DA-ARO(D)-31-124-G77)
Unclassified report

DESCRIPTORS: *Radio equipment, *Direction finding, *Applied mathematics, Least squares method, Analysis of variance, Mathematical analysis, Statistical analysis, Digital computers.

The problem in the use of radio direction finding techniques of estimating the variances of the readings obtained from the different receivers is investigated. These variances are used to perform a least squares estimate for the most probable point for the transmitter. One may not know the true position of any transmitter and, therefore, cannot obtain an estimate of the variance of a single receiver. By taking several receivers an estimate is made of the transmitter position and using this information, an estimate is made of the accuracy of the various receivers. A specific model was described which was simulated on a high-speed computer. The theory, computations to be performed, and results are described. The method is able to distinguish between good and poor receivers and in many cases gives excellent approximations to the variances. (Author)

AD-290 325 Div. 5, 8
(TISTP/WH) OTS price $11.00

New York U., Coll. of Engineering, N. Y.
THE ESTIMATION PROBLEM IN NULL-ZONE RECEPTION

FEEDBACK SYSTEMS,
by J. J. Metzner and K. C. Morgan. 15 Aug 62, 137p. incl. illus. tables, 26 refs. (Scientific rept. no. 11)
(Contract AF 19(604)6168, Proj. 4610)
(AFCRL 62-742) Unclassified report

DESCRIPTORS: *Radio communication systems, *Feedback, *Noise (Radio), *Information theory, *Digital systems, *Pulse communication systems, *Statistical analysis.

Null-zone-reception decision-feedback systems are shown to work almost as well when statistical estimation must be used to determine the threshold settings as when channel conditions are known exactly. This conclusion cannot, of course, encompass all possible channel models, but is based on careful investigation of a synchronous binary symmetric phase-shift system with gaussian noise, plus briefer examination of two envelope-detection systems. An estimation procedure which is optimum, under certain assumptions, is presented, but this is not, in general, computationally feasible. Two non-optimum procedures which are simple and practicable are presented, however, one based on a power measurement method and the other on an average magnitude approach, and both are shown to yield good results, the latter being somewhat superior. When signal-strength correlation is appreciable over as few as ten digits, overall system performance is only slightly less efficient than would be attained with exact knowledge of the channel conditions. Methods of minimizing the undesirable effects of impulsive and burst-type noise are discussed. (Author)

AD-290 679 Div. 5
(TISTB/CCH) OTS price $1.60

Lebell, Don, Associates, Sherman Oaks, Calif.
DEVELOPMENT OF A DATA-TO-SPEECH CONVERTER.
Final rept.,
by Harold Johnson. 27 Aug 62, 10p. illus.
(Engineering rept. no. 61-101)
(Contract AF 30(602)2345)
(RADC TR 61-305) Unclassified report

DESCRIPTORS: *Analog-to-digital converters, *Speech representation, *Vocabulary, Speech transmission, Sound, Digital computers.

A method is presented for converting sequence of digital information directly into corresponding sequences of spoken words. The long range design objective for this device is to operate on command of a computer at speech rates and fidelity approximating natural speech with a 10,000 to 50,000 word vocabulary. A design study was made, an optimal approach selected, and a feasibility model constructed. This model contains a random access photo-optical memory which stores 500 prerecorded words on film for photo-electric readout on command from a manual keyboard or paper tape. The specific design configuration is demonstrably extendable to a full size vocabulary at acceptable data rates and fidelity. (Author)

AD-290 754 Div. 5
(TISTW/DLW) OTS price $3.60

Motorola, Inc., Chicago, Ill.
DATA TRANSMISSION INVESTIGATION.
Quarterly progress rept. no. 4, 11 June-10 Sep 62,
by J. J. Tsimbidis. 10 Sep 62, 35p. incl. illus. tables.
(Contract DA 36-039-sc-87343, Proj. 3B31-01-001)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Voice communication systems, *Radio communication systems, *Military communications, *Field wire communication systems, Multiplex transmission, Signal-to-noise ratio, Noise (Radio), Errors, Reliability, Tests, Digital systems.

White noise tests were performed on the di-phase modem at 600 and 1200 bps. Performance of the AN/TYC-1 (XC-2) over the AN/TCC-7 in the presence of white noise was also evaluated and the results of these tests are presented in graphical form. Performance tests of the modems operating over the AN/TCC-44 time multiplex communications link were initiated. Tests of modem operation over tandem channels of the AN/TCC-7 were completed. The tests of modem compatibility with an AN/VRC-12 radio link setup in the laboratory were completed. The results show that the radio set should provide a good communication link for digital data transmission. The channel characteristics of an AN/TCC-7 system connected through an AN/TRC-24 radio link were measured. Field tests of the AN/TCC-7 cable system were also continued. (Author)

AD-291 156 Div. 5
(TISTW/RD) OTS price $9.10

Smith Electronics, Inc., Cleveland, Ohio.
NAVY VLF SITE LOCATION PROJECT.
Final rept. of Engineering Site Survey,
by Carl E. Smith, Earl M. Johnson and others.
1 Nov 56, 1v. incl. illus. tables, 80 refs.
(Contract NObsr-71360)
Unclassified report

DESCRIPTORS: *Radio stations, Tests, Terrain, Geology, Electrical properties, Very low frequency, Geography, Antennas.

Basic information is given concerning the electrical characteristics of the sites investigated. The median conductivity for the respective sites were; 0.575 millmho for Alfa, 1 millmho for Echo, 0.6 millmho for X-Ray. The median conductivity for all measurements made was 0.75 millimho. The tide water flats measured 100 millimho and sea water measured 4 mho. A reference antenna and ground system was selected for the purpose of making site comparisons. A surface resistance technique was developed and applied in comparing the sites. The effect of terrain on electrical performance of the antenna system was evaluated. The geology of the various sites was considered. Theoretical and experimental studies were made of the ground system losses. Useful handbook type graphs of antenna and ground system parameters were prepared. Equations were developed to evaluate the ground system losses, within the aperture, within the ground system beyond the aperture and the ground losses beyond the ground system. (Author)

AD-291 176 Div. 5
(TISTW/DLW) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
COMPUTATIONAL PROCEDURES FOR DETERMINATION OF RECEIVED POWER AND RELIABILITY OF IONOSPHERIC SCATTER COMMUNICATION SYSTEMS.
Final technical no. 4,
by Bruce M. Sifford. Aug 61, 53p. incl. illus. tables, 16 refs.
(Contract DA 36-039-sc-85052)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Ionospheric propagation, *Radio transmission, *Radio reception, *Radio teletype systems, Attenuation, Very high frequency, High frequency, Vulnerability, Reliability, Data processing systems, Theory, Programming, Test methods, Radiofrequency power, Ionosphere, Scattering, Mathematical prediction, Effectiveness.

Prediction equations for the ionospheric scatter mode of radio wave propagation are formulated from the most consistent contemporary theories and from the results of available propagation experiments. The turbulent and meteor mode components of the scatter signal are considered separately. Equations are developed for each of these two components as a function of system parameters, path geometry, and predictable characteristics of the particular mode. Fading differences in the two components are analyzed to determine their effect on circuit reliability for typical teletype communications systems. The detailed computational procedures given are used to write a computer program from which the reliability of ionospheric scatter communications links can be predicted. (Author)

AD-291 177 Div. 5
(TISTP/TL) OTS price $8.60

Stanford Research Inst., Menlo Park, Calif.
THE HF PROPAGATION PREDICTION PROGRAMS FOR THE IBM 7090 COMPUTER.
Final technical rept. no. 2,
by Edel M. Young and E. A. Clarke. May 62,
87p. incl. illus. tables, refs.
(Contract DA 36-039-sc-85052)
Unclassified report

DESCRIPTORS: *Communication systems, *High frequency, *Radio communication systems, *Mathematical prediction, Digital computers, *Programming, Radio jamming, Signal-to-noise ratio, Noise (Radio), Propagation.

Two computer programs that predict the quality of HF links in a communications network are described. The computer programs described here supersede an earlier program which predicted the vulnerability to intentional jamming of links in a network. The programs described here consider jamming, but can also consider a communication network without jamming. They are flexible in many respects. (Author)

6. DETECTION

AD-289 809 Div. 6, 25
(TISTE/CAM) OTS price $2.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUB-MILLIMETER WAVE RECEIVER TECHNIQUES.
Quarterly rept. no. 2, 1 June-1 Sep 62.
15 Oct 62, 20p. incl. illus. table, 3 refs.
(Contract AF 30(602)2456, Proj. 4505)
(RADC TDR 62-250) Unclassified report

DESCRIPTORS: *Microwaves, *Infrared detectors, *Infrared optical systems, *Radar receivers, *Infrared receivers, *Transmission lines, Ferroelectric crystals, Ferroelectric materials, Electromagnetic lenses, Frequency modulation, Voltage, Sensitivity, Radiofrequency coils, Electric shunts, Resistance, Cavity resonators, Waveguides, Reflectors, Focusing, Theory, Detectors, Single crystals, Model tests.

The pyroelectric effect detector was tested experimentally. The sensitivity of the experimental model varies between 2 x 10 to the -11th power amperes/milliwatt and 4 x 10 to the -11th power amperes/milliwatt depending on the temperature of the sample. The use of a shunt inductor to increase the output of the detector was investigated. By choosing the inductor so that the crystal capacitance and the inductor form a resonant circuit at the modulation frequency, the output was increased. The possibility of using metal reflectors rather than dielectric lenses for the phase correctors was investigated. Also being studied is the problem of energy focusing on a beam waveguide for efficient detection. One proposed scheme of doing this consists of using a series of lenses of decreasing focal length to decrease the energy spot size. A tapered dielectric rod was used to focus the energy onto the detector. (Author)

AD-289 833 Div. 6, 22
(TISTW/RD) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
THE NOLC G-LINE DYNAMIC RANGE SIMULATOR,
by E. W. T. Des Marets. 1 Nov 62, 11p. incl. illus.
(NAVWEPS rept. no. 7174) Unclassified report

DESCRIPTORS: *Detectors, *Radar ranges, *Radar target position simulators, Transmission lines, Guided missile fuzes, Test equipment, Simulation.

The NOLC G-line dynamic range simulator employs the principle of the surface-wave transmission line for measuring the dynamic range response of small, short-range radar devices. Energy from the transmitter of the device being tested is transmitted through a series of RF components to a launching horn, which launches the energy along the G-line. A removable reflector returns the energy along the G-line to the horn and back through the RF components to the receiver of the device under test. Reflector travel is accomplished by a power-drive system, which includes a precise method of controlling the measuring reflector travel. The return signal is applied to the vertical amplifier of an oscilloscope with the horizontal sweep time set to equal the travel time of the reflector. The trace is photographed by a polaroid camera set for a time exposure, and the envelope thus produced shows the sensitivity of the device under test as a function of range. The facility will accommodate ranges to 2000 ft. Frequencies from the UHF region to the millimeter wave band can be propagated over the line by using the proper horn and reflector sizes. The G-line has much lower attenuation than either waveguide or coaxial cable. A listing of NOLC drawings covering construction details is given and the method of installation of the long G-line span is described. (Author)

AD-289 886 Div. 6
(TISTP/FR) OTS price $2.25

Aeronutronic, Newport Beach, Calif.
FEASIBILITY INVESTIGATION OF A PACM-FM TELEMETRY SYSTEM.
Final rept., June 61-May 62.
Oct 62, 86p. incl. illus. tables, 5 refs.
(Contract AF 33(616)8432, Proj. 4107)
(ASD TDR 62-637) Unclassified report

DESCRIPTORS: *Telemeter systems, *Pulse modulation, Frequency modulation, Digital systems, Feasibility studies, Amplitude modulation, Multiplex transmission.

A program was carried out to verify the feasibility of the PACM-FM Telemetry System concept. The tasks carried out were (1) design and construction of a PACM-FM ground station, (2) design and construction of a vehicleborne data converter to generate PAM, PCM, and PACM formats, (3) laboratory test with various formats and data rates to establish system performance, and the capabilities of the equipment developed, (4) analysis and evaluation of the PACM-FM system to predict equipment electrical and operational characteristics, (5) preparation of recommended procurement specifications based on tests, analysis, and evaluation. The tests and analysis disclose that the performance obtainable for PAM and PCM in the PACM format is the same as in the pure PAM and PCM formats. The performance attained agrees with that which had been predicted earlier. It has been found practical to handle all data in the ground station on a unified basis for storage; display, and processing regardless of the form in which it was transmitted. The system has been found to be feasible in every respect. (Author)

AD-290 478 Div. 6
(TISTW/RD) OTS price $6.60

Motorola, Inc., Scottsdale, Ariz.
ADVANCED RADAR BEACON TECHNIQUES STUDY AND DEVELOPMENT.
Quarterly progress rept. no. 1, 1 May-31 July 62, by F. Kemmeries, N. B. Metteer and others. Aug 62, 57p. incl. illus. tables, 9 refs. (Contract DA 36-039-sc-90700, Proj. 3A99-23-001)
Unclassified report

DESCRIPTORS: *Radar beacons, Design, Solid state physics, C band.

Theoretical analysis and preliminary configuration design is discussed for several microwave receiver solid state devices, for low noise and high sensitivity C-band radar beacon front-end applications. These include an analysis of parametric amplifier pump power requirements for two modes of operation, characteristics of suitable varactor diodes, and preliminary configuration design of a compact parametric amplifier. Analysis of a tunnel diode mixer is included. Three suitable designs evolved, of which two utilize self-oscillation at one-half normal oscillator frequency and the third designed for use with an externally applied local oscillator. Analysis of tunnel diode oscillators and several available tunnel diodes are discussed leading to preliminary design of a tunnel diode local oscillator. Analysis of the requirements and design of a pulse time modulator and time discriminator is included. This guided the design of a servo time delay compensator for the purpose of reducing variations in delay between received and transmitted pulses in a radar beacon. (Author)

AD-290 542 Div. 6
(TISTA/GEC) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
TEST LAUNCHER DESIGN FOR SONOBUOY,
by R. H. Waser, A. Garcia, and R. A. Montgomery. Sep 62, 7p. incl. illus. (Ballistic research rept. no. 70; NOLTR 62-108)
Unclassified report

DESCRIPTORS: *Radio sono buoys, Design, Tests, Water entry, Acceleration, Air brake flaps, Velocity, Test equipment, Launching.

The design, construction and operation of a launcher built to propel an 8-lb sonobuoy at velocities up to 150 fps for water impact tests is described. Further specifications were that the sonobuoy's 9-in.-diameter air brake be open, that there be provision for trailing wires, and that the maximum acceleration not exceed 300 g's. (Author)

AD-290 697 Div. 6
(TISTW/RD) OTS price $2.60

Naval Research Lab., Washington, D. C.
A TECHNIQUE FOR NARROW-BAND TELEMETRY OF NONRECURRENT PULSES,
by J. E. Abel and P. T. Stine. 26 Oct 62, 26p. incl. illus. 22 refs. (NRL rept. 5846)
Unclassified report

DESCRIPTORS: *Telemeter systems, *Telemetering data, *Data transmission systems, *Data processing systems, Design, Narrowband.

A pretransmission data processing technique has been developed to meet several unusual telemetering requirements. The technique has been implemented and the performance of a laboratory model has verified the validity of the technique. The data to be telemetered and the operational environments are as follows: (a) the input will be either a single pulse or a series of pulses which are nonrecurrent, (b) within limits the time sequence of the events generating the data will be known, (c) at the time of data occurrence, reception from the vehicle carrying the telemetering system will not be possible, and (d) data will be transmitted on a standard FM-FM link. The techniques employed for solution of the problem are: (a) the first input signal shall start the complete measurement process, (b) the peak amplitude of the input function is sampled at selected discrete time intervals which occur sequentially during the time of the input function, (c) these samples are channelized and converted to dc voltages which are a function of the time-selected peak amplitudes, (d) the dc voltages are stored and presented as continuously available outputs, and (e) these data can be sampled and transmitted over conventional telemetry or communication links and used, with a priori knowledge of the sampling time sequence, to reconstruct the input function. (Author)

AD-290 953 Div. 6
(TISTW/RD) OTS price $5.60

Dunlap and Associates, Inc., Stamford, Conn.
DESIGN PARAMETERS FOR A LIGHTWEIGHT HANDHELD RADAR SYSTEM AN/PPS-6 ( ).
Final rept. on Task .18F,
by Leroy L. Vallerie and Robert T. McCay. Jan 62, 1v. incl. illus.
(Contract DA 36-039-sc-78921)
Unclassified report

DESCRIPTORS: *Doppler radar, *Moving target indicators, *Detection, Design, Human engineering, Tests, Army operations, Surface targets, Personnel, Enemy personnel.

A developmental, lightweight, handheld radar set, AN/PPS-6 ( ), is described; the projected mission of the system is summarized and relevant human capabilities are reviewed. Based upon these factors, an allocation of function between the operator and his equipment is presented. The original prototype model of the equipment is reviewed from the human factors viewpoint, and an alternative design concept presented. Details of the system mission analysis are presented and a report of three laboratory studies of aiming steadiness is given. (Author)

AD-290 954 Div. 6
(TISTW/RD) OTS price $5.60

Dunlap and Associates, Inc., Stamford, Conn.
DWELL TIME, NOISE AND TARGET TYPE. AN EXPERIMENTAL STUDY OF AURAL DETECTION OF RADAR TARGETS.
Final rept. on Task .16F,
by Robert McCay. Feb 62, 1v. incl. illus. tables, 7 refs.
(Contract DA 36-039-sc-78921)
Unclassified report

DESCRIPTORS: *Acoustic detectors, *Radar targets, *Radar signals, *Radar reflections, Search radar, Doppler radar, Range gating, Signal-to-noise ratio, Vehicles, Personnel, Headphones, Detection, X band, Audiofrequency, Identification.

The problem of specification of dwell time is set in the context of its implications for operational effectiveness. Two studies are presented which investigated the effect of eleven dwell times, five noise levels and two target types upon the probabilities of detection and identification of aural radar target signals. These studies were conducted through the use of simulated radar watch programs synthesized from tape-recorded X-band returns and presented binaurally via headphones. It is concluded that dwell times as short as one-eighth second can be tolerated if only vehicular targets are of interest, but that at least one-half second dwell time is necessary if personnel targets are to be considered. Noise level is found to affect performance more for personnel than for vehicular targets. Details of circuitry and experimental design are presented. (Author)

AD-291 102 Div. 6, 2
(TISTW/RD) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIO-ECHO OBSERVATIONS OF THE MOON AT 68-CM WAVELENGTH,
by J. V. Evans. 22 June 62, 24p. incl. illus. table, 37 refs. (Technical rept. no. 272)
(Contract AF 19(604)7400)
(AFESD TDR 62-241) Unclassified report

DESCRIPTORS: *Radar echo areas, *Radar reflections, *Moon, *Radio astronomy, Scattering, Polarization, Microwaves.

Radio-echo studies of the moon were conducted at a wavelength of 68 cm by means of short-pulse experiments. In an earlier report, a similar experiment was described for observations conducted at a wavelength of 3.6 cm. A comparison of the new results with those obtained at 3.6 cm shows that the angular scattering properties of the lunar surface are wavelength dependent. The result is supported by observations at an intermediate wavelength of 10 cm. (Author)

7. ELECTRICAL EQUIPMENT

AD-290 068 Div. 7
(TISTM/EJH) OTS price $2.60

Aerojet-General Nucleonics, San Ramon, Calif.
FEASIBILITY DETERMINATION OF A NUCLEAR THERMIONIC SPACE POWER PLANT.
Quarterly technical progress rept. for 1 Aug-31 Oct 62,
by K. E. Buck. 31 Oct 62, 22p. incl. illus. 3 refs. (Rept. no. AN-778)
(Contract AF 33(657)8977, Proj. 8173)
Unclassified report

DESCRIPTORS: *Power supplies, *Thermionic emission, *Electric power production, Radiators, Liquid metals, Electric insulation, Ceramic coatings, Aluminum compounds, Oxides, Niobium alloys, Molybdenum, Metal coatings, Brazing, Coolants, Pipes, Thermal conductivity, Cesium, Vapors, Fast reactors, Spaceships, Cathodes.

The work discussed was directed toward demonstration of the feasibility of the Nuclear Thermionic Radiator Space Power System. It is a continuation of work initiated on Contract AF 33(616)8119. The specific objectives of the current program are: (1) to demonstrate operation of a minimum of three thermionic converters in a series array using heat from a liquid metal loop to heat the cathodes; and (2) to demonstrate 1000 hours of thermionic operation using liquid metal heating. (Author)

AD-290 238 Div. 7, 14, 26
(TISTM/EJH) OTS price $10.10

Westinghouse Electric Corp., Pittsburgh, Pa.
INORGANIC BINDERS FOR C CORES.
Final rept., 1 Dec 60-29 Sep 62,
by J. Seidel and C. A. Eaves. 29 Sep 62, 1v. incl. illus. tables (Research Labs. rept. no. 6243-46902-F)
(Contract NObsr-85304, Proj. SR-0080302)
Unclassified report

DESCRIPTORS: *Magnetic cores, *Binders, *Magnetic materials, Steel, Glass, Ceramic coatings, Silicon compounds, Sodium compounds, Oxides, Bonding, Laminates, Composite materials, Manufacturing methods, Wire winding machines, Heat treatment, Cutting tools, Grinders, Chemical milling, Aging, Magnetic properties, Electrical properties, Excitation.

An inorganic glassy binder and a method for its application to a wound-cut type C core were developed. The binder, having a composition and the properties of glass, served as an electrical insulator as well as the adhesive. Sample cores were constructed by fusing a very thin layer of the binder to the surfaces of grain-oriented silicon-steel strips and winding the composite until the required build-up was obtained. During the requisite stress relief anneal, a laminar bond between the adjacent binder-coated turns was accomplished. A total of 48 sample cores were constructed for binder evaluation. Sample cores constructed with 2 steel thicknesses had space factors, net steel weights, and mean magnetic paths nominally equivalent to commercial cores. These cores were evaluated for core loss and excitation at various flux densities at room temperature, 400, 600 and minus 55 C. Effects of heat aging on their mechanical and electrical properties were determined. The core loss and excitation values at 15 kilogausses were less than the published rejection limits for equivalent commercial cores. (Author)

AD-290 465 Div. 7, 9, 12
(TISTA/GEC) OTS price $10.10

Allison Div., General Motors Corp., Indianapolis, Ind.
CONTINUATION OF 3-KW STIRLING CYCLE SOLAR POWER SYSTEM PROGRAM.

Quarterly technical progress rept., 1 May-31 July 61,
by D. S. Monson. 4 Aug 61, 116p. incl. illus. (Engineering dept., rept. no. 2236)
(Contract AF 33(616)8332, Proj. 3145)
Unclassified report

DESCRIPTORS: *External combustion engines, *Power supplies, Electric power production, Design, Heat exchangers, Operation, Effectiveness, Thermodynamics, Pressure, Heat transfer, Seals, Pistons, Fluid flow, Liquefied gases, Satellite vehicles, Test equipment, Space probes, Research program administration, Solar energy, Auxiliary power plants.

The PD-46 engine, with minor modifications to the heat exchanger components, was tested with N, H, and He as working fluids in order to better evaluate the performance of the heat exchanger components and to determine the magnitude of the generator and drive mechanism windage losses. Development and endurance tests of nonlubricated power piston seals were continued. A simple test rig was designed and fabricated for the purpose of evaluating the pressure drop of a single heater tube under pulsating flow conditions. An available flow test facility was modified in order to evaluate the pressure drop of the regenerator. A test rig to evaluate pressure losses through the complete heat exchanger circuit (heater, regenerator, and cooler) under pulsating flow conditions was designed and fabricated. Preliminary design and configuration studies were continued. (Author)

AD-290 553 Div. 7, 8
(TISTE/OHD) OTS price $1.10

Scripta Technica, Inc., Washington, D. C.
ON THE LIMITED FREQUENCY OF FLASHES OF PULSE TUBES,
by I. S. Marshak, V. P. Zhil'tsov, and L. I. Shchukin. 1962, 7p. incl. illus. 11 refs.
(Trans. no. T-1658)
Unclassified report

DESCRIPTORS: *Stroboscopes, *Flash lamps, *Discharge tubes, *Gas discharges, *Glow discharges, *Electric discharges, *Frequency, Electronic circuits, Voltage, Electric currents, Capacitors, Resistors, Timing circuits, Thyratrons, Pulse generators, Relaxation time, Experimental data, USSR, Translations.

The limited frequency of discharges, related to the recovery time of the electric strength of the tube's discharge interval, depends on its design, voltage supply, power being dissipated in the lamp, and the voltage increase curve on the contact electrodes in the intervals between discharges. Two extreme lamp designs were investigated: one with a capillary quartz discharge tube of internal diameter -- 0.5 mm, length -- 70 mm, and the other with a large spherical envelope of envelope diameter -- 65 mm, distance between electrodes -- 6 mm. The different variations of circuit diagrams used prevented a voltage increase in the tube after the regular flash by means of a pause in the charge current in the storage capacitor circuit. (Author)

AD-290 554 Div. 7
(TISTP/FR) OTS price $1.10

Scripta Technica, Inc., Washington, D. C.
ON THE QUALITY OF TYPE Yu-16 LUXMETERS,
by V. S. Khazanov and A. M. Fomina. 1962, 3p. incl. illus. 2 refs. (Trans. no. T-1659)
Unclassified report

DESCRIPTORS: *Photometers, Lighting systems, Tests.

The Type Yu-16 Luxmeter consists of a rectangular selenium photo-element, with a working area of 25 sq cm and a meter of 1.0 accuracy. The luxmeter has three basic measurement ranges of 25-100-500 lux and three supplementary ranges of 2,500-10,000-50,000 lux, obtained by means of an absorber mounted on the photo-element. The absorber consists of a metal frame holding two plates of frosted damped lucite. Between the two layers of lucite, there is an insert of opaque material with small openings. In accordance with technical specifications, the basic error of the luxmeter, with respect to its primary ranges, is ± 10% and, in its supplementary ranges, ± 15%, of the magnitude measured. To improve the quality of luxmeters of Type Yu-16, the following must be accomplished: (1) the quality of the selenium photo-elements must be greatly improved, and only photo-elements that have naturally aged over a period of 6-12 months should be installed in the luxmeters; (2) the absorber design must be changed: a smooth-surface plastic should be substituted for the matte plastic so that its surface can be kept clean; and (3) to insure stability of the photo-element's sensitivity, the sensitive layer must be better protected against moisture. (Author)

AD-290 555 Div. 7
(TISTP/FR) OTS price $1.10

Scripta Technica, Inc., Washington, D. C.
NORMS FOR ARTIFICIAL LIGHTING,
by N. N. Firsanov. 1962, 2p. incl. illus.
(Trans. no. T-1660)
Unclassified report

DESCRIPTORS: *Illumination, *Railroad tracks, Standards.

The new draft of 'Norms for Artificial Lighting' proposes to exclude paragraph 9 of Chapter II-C.6, 1959, which authorizes, provided that conditions for the limitation of glare are observed, a 50% reduction in the norms governing the lighting of open areas in industrial establishments and in railroad stations. At present, this authorization is widely used in the design of exterior lighting of railroad stations, particularly when light fixtures are employed. Exclusion of this paragraph from the new draft of the 'Norms' is, generally, valid, since its purpose is the improvement in the quality of lighting installations. However, it becomes difficult to maintain a fairly high standard of illumination -- 5 lux -- in the arrival, departure, and marshalling yards of large railroad yards; this is particularly the case when light fixtures are employed that are suspended from flexible lateral cables spanning the tracks. Maintenance of this standard without reduction will result in unjustifiable increases in capital expenditures for the lighting installations and increased electric power consumption. (Author)

AD-290 556 Div. 7
(TISTP/FR) OTS price $1.10

Scripta Technica, Inc., Washington, D. C.
LIGHTS WITH SODIUM LAMPS,
by M. A. Ostrovskiy and T. L. Flodina. 1962, 3p. incl. illus. table, 4 refs. (Trans. no. T-1657)
Unclassified report

DESCRIPTORS: *Lighting equipment, *Glow lamps, *Sodium, Illumination, Roads.

The body of the light is made of Silumin alloy in two versions -- with flanges for placement on a cantilever bracket (SKN-140) and with lugs for use as a suspended light (SPN-140). Attached to the body by screws is a reflector, painted with white enamel, which in turn serves as a bearing element of the lamp. One end of the lamp is inserted into the socket, and the other is held in horizontal position by a spring loop. Attached to the bulb (which is made of org-glass) there are, on the inside two prismatic inserts which redistribute the light flow of the lamp in the desired directions. The bulb opens downward and, in its closed position, is held shut by two victrola-type clasps. (Author)

AD-290 618 Div. 7, 4
(TISTM/TCG) OTS price $1.25

Armour Research Foundation, Chicago, Ill.
CHEMICAL CONVERSION OF WASTE HEAT TO ELECTRICAL ENERGY.
Quarterly rept. no. 8, 1 Apr-30 June 62, by C. Roland McCully. 30 June 62, 40p. incl. illus. tables, 3 refs. (Rept. no. ARF 3182-9)
(Contract NOw 60-0760-c)
Unclassified report

DESCRIPTORS: *Primary batteries, *Electrolytic cells, *Power supplies, *Electricity, Glass textiles, Chemical reactions, Tellurium compounds, Copper compounds, Chlorides, Antimony compounds, Arsenic compounds, Aluminum compounds, Potassium compounds, Sodium compounds, Lead compounds, Battery separators, Eutectics, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Pyrolysis, Melting, Electrolytes, Solids, Conductivity, Thallium compounds, Additives.

Development of the chemical method of converting heat to electrical energy is reported. Parallel development of systems based on the Cu-Te chlorides and Sb chlorides has continued. The former system has afforded the more favorable galvanic cell characteristics. Although this system is technically feasible, practical regeneration of the anode liquid has not been achieved because of complications in separating the resulting TeCl2 and Cl2 gases at the regeneration temperatures. Separation as a result of the selective solubility of TeCl2 in a molten carrier salt gives promise of becoming practical, but at present the solubility of 1-3% is below the 20% solubility deemed necessary. The principal effort with the SbCl3 system has been to obtain satisfactory galvanic cells characteristics, a problem that originates with the very low ionic conductivities of the Sb chlorides. Specific conductivities of 0.002 and 0.007 were found practical at 75 C for the cathode and anode systems, respectively. A solid ionic electrolyte based on PbCl2 doped with KCl has been developed to a degree satisfactory for the Sb chloride system. (Author)

AD-290 727 Div. 7, 20, 25
(TISTP/WH) OTS price $9.60

General Motors Research Labs., Warren, Mich.
INVESTIGATIONS ON THE DIRECT CONVERSION OF NUCLEAR FISSION ENERGY TO ELECTRICAL ENERGY IN A PLASMA DIODE.
Annual rept., 1 Feb-31 Oct 62, ed. by Frank E. Jamerson. 31 Oct 62, 1v. incl. illus. tables, refs.
(Contract Nonr-310900)
Unclassified report

DESCRIPTORS: *Neutron flux density, *Rare gases, *Thermionic emission, *Fission neutrons, *Plasma physics, *Fission products, *Uranium, Cathodes.

Results of experimental and theoretical investigations are presented on the use of a nuclear generated plasma in a noble gas plasma diode thermionic converter. Related programs of emitter materials development and plasma measurements are described. These are presented in the following individual sections contained in this report: (1) inpile ion chamber experiment - theory and tube design, (2) pulsed noble gas plasma diode experiments, (3) electron mobility in gases, (4) spectroscopic measurements in a cesium low voltage arc converter, and (5) uranium carbide-rhenium cermet emitter. (Author)

AD-290 778 Div. 7, 25
(TISTE/CAM) OTS price $6.60

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
A HIGH PERFORMANCE D.C. MAGNET UTILIZING AXIAL COOLED DISCS,
by H. Brechna and D. B. Montgomery. Sep 62, 44p. incl. illus. tables, 15 refs. (Rept. no. NML-62-1)
(Contract AF 19(604)7344)
Unclassified report

DESCRIPTORS: *Electromagnets, *Solenoids, Magnet coils, Cooling, Temperature, Iron, Direct current, Theory, Magnetic fields, Heat transfer, Pressure.

Described is a water cooled magnet of the general Bitter type, which generates 130 kgauss at a power input of 1.75 megawatts. The magnet consists of a stack of 1 inch bore axial cooled discs and a surrounding shell of iron. The coil field is increased by about 10% by the use of 600 pounds of low carbon iron. Three cases of design are treated: (1) The radial temperature distribution is assumed to be constant. A hexagonal cooling pattern was introduced. The cooling holes have the same hydraulic diameter throughout the plates. (2) Due to the distribution of the cooling holes it can be shown that the temperature distribution is not constant and rises from the inner edge of the plates towards the outer edge. (3) A nonuniform temperature distribution in a coil is not desirable, especially with a high heat flux. The hot spot temperature determines the burnout power of the magnet. Discussed are the burnout heat flux limitation of the magnet and the magnetic stresses. Equipotential plots utilizing resistance plotting paper are shown to illustrate the flow of current around closely spaced cooling holes and the increase of effective resistance. It is shown that the current path follows a sinusoidal law. A table is given comparing calculations and measurements. The measured field of 130 kgauss was 2.5% less than the calculated field. (Author)

AD-290 803 Div. 7, 4
(TISTM/EJH) OTS price $2.60

TYCO Labs., Inc., Waltham, Mass.
RESEARCH RELATING TO FUEL CELLS.
Quarterly rept. no. 4, 1 July-30 Sep 62, by A. K. M. Shamsul Huq. 30 Oct 62, 13p. illus. tables, 13 refs.
(Contract DA 49-186-ORD-982)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrolytic cells, *Oxygen electrodes, *Power supplies, Electrodes, Gold, Oxygen, Hydrogen compounds, Peroxides, Sulfuric acid, Perchloric acid, Solutions, Oxidation, Reduction, Reaction kinetics, Electrochemistry, Electric potential.

Investigation of the oxygen electrode in acid solutions is reported in order to elucidate the relevant mechanisms and to establish their response to changes in solution and electrode parameters. The following tasks were undertaken: (1) Experimental results were obtained for the anodic evolution and cathodic reduction of O2 in normal sulfuric and perchloric acid solutions on bright gold electrodes. Results obtained appear to be highly significant. (2) The electrochemical reaction orders for the anodic oxidation and cathodic reduction of H2O2 on bright gold electrodes were determined and found to be first order in both cases. The significance of this observation with regard to the resting potential of noble metal electrodes in acid H2O2 solutions and also in connection with certain proposed reaction mechanisms is discussed. (Author)

AD-290 955 Div. 7, 8
(TISTE/OHD) OTS price $3.60

Texas Instruments, Inc., Dallas.
LOW WORK FUNCTION SEMICONDUCTOR COLLECTORS.
Summary rept. no. 1, 1 July-31 Oct 62 on Basic Research in Thermionics, Part 2,
by R. A. Chapman, H. W. Hemstreet and others.
Nov 62, 30p. incl. illus. tables, 32 refs.
(Contract Nonr-370500, Proj. NR 099-364)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Work functions, *Semiconductors, Cesium compounds, Thin films, Semiconducting films, Vapor plating, Voltage, Antimony, Tellurium, Tungsten, Tantalum, Experimental data.

Cesium-antimony and, in one case, cesium-tellurium compounds as film coatings on nickel substrates were investigated for possible collectors in thermionic energy converters. The reactant metal was deposited on the substrate and later reacted with cesium. No difference was detected among antimony films evaporated in the experimental tube, evaporated before assembly, and electroplated. Film thicknesses were in the range 1000 - 10,000 A. Two types of metal-glass experimental devices were utilized. In most cases, the thermionic work function was measured by contact potential difference with an electron-emitting refractory metal. Cesium reservoir temperatures were used from 75 to 125 C. The collector temperature in most cases was not more than 15 C higher than the cesium reservoir temperature, but in one device was roughly 100 C higher. It was found: (1) the thermionic work function of the cesium-antimony coated nickel collector was in some experiments 1.3 ± 0.1 eV, (2) the thermionic work function of the cesium-tellurium coated nickel collector was consistently 1.2 ± 0.1 eV in the one experiment run with this collector; (3) more control must be obtained over film thickness and chemical purity to determine the cause of the variation in observed thermionic work function. (Author)

AD-291 076 Div. 7, 25
(TISTP/WH) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
ENERGY CONVERSION PROGRAM. MAGNETOHYDRODYNAMIC GENERATOR.
Semiannual technical rept. 1 Jan-30 June 62, by W. R. Grabowsky and K. E. Starner. 31 Aug 62, 28p. incl. illus. 6 refs. (Rept. no. TDR-69 (2220-40)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-171) Unclassified report

DESCRIPTORS: *Energy, *Electric power production, *Magnetohydrodynamics, *Tantalum, *Tungsten, *Aluminum, *High temperature research, Creep, Tensile properties, Mechanical properties.

Progress in the materials studies of interest in the design and study of a magnetohydrodynamic (MHD) vortex generator for use in a closed-cycle power conversion system is described. Experimental results of tests to determine the tensile strength properties of tantalum to its melting point are presented. Measurements of temperature creep and stress deformation definitely indicate that creep rate will rule out use of tantalum as the sole structural material at design stresses greater than 600 psi. Fabrication difficulties in the use of tungsten possibly may be overcome or alleviated by wire-wrapped construction. Design of an electron bombardment heated test facility to determine the electrical resistivity of high-temperature (2500 K) insulating materials is covered in detail. (Author)

AD-291 077 Div. 7, 4, 25
(TISTE/OHD) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS PROGRAM. LOW TEMPERATURE ELECTRONICS.
Semiannual technical rept., 1 Jan-30 June 62,
by F. Vernon, Jr. Oct 62, 12p. incl. illus. 3 refs. (Rept. no. TDR-69(2250-13)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-196) Unclassified report

DESCRIPTORS: *Cryogenics, *Low temperature research, *Solenoids, Superconductivity, Magnetic fields, Magnet coils, Electric currents, Niobium alloys, Zirconium alloys.

Two high-field superconducting solenoids were designed and tested. Fields of 24 kilogauss were obtained in the last design in a coil with a working inner diameter of 0.5 inches. Instrumentation was assembled toward efforts on other phases of high-field superconductivity. (Author)

AD-291 101 Div. 7, 6
(TISTW/DLW) OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
PERFORMANCE TESTS OF PROJECT PRESS INSTRUMENTATION TURRET DRIVE MOTORS,
by C. W. Thrift. 18 Dec 62, 14p. incl. illus. tables, 5 refs. (Technical memo. no. NMC-TM-62-39)
Unclassified report

DESCRIPTORS: *Airplane turrets, *Optical tracking, *Optical instruments, *Servo motors, *Electric motors, Mechanical drives, Elevating gear, Instrumentation, Power drives, Airborne, Guided missile tracking systems, Tests, Effectiveness, Guided missiles, Mounting brackets.

Drive motors to be used for positioning the turret of the Project PRESS instrumentation platform were tested under average laboratory conditions. The performance characteristics of two sizes (1 hp and 1/2 hp) of motors were determined to (1) aid in the analysis of the transfer functions of the control system of the instrument platform and (2) serve as the basis for

choosing which of the two available sizes of motor is preferable. The test results indicate that the two sizes of motors have almost identical characteristics but that the 1-hp size is preferable because of its higher armature current capacity which results in larger torque output capacity. (Author)

AD-291 162 Div. 7
(TISTM/REB) OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
APPLIED RESEARCH MANAGEMENT ABSTRACT BULLETIN. PART I. ABSTRACTS 1-1645-THROUGH 1-1703,
by K. B. Andrews, N. B. Crow and others.
May 62, 66p. (Rept. no. TDR-930(2701-01)TN-1, pt. 1, no. 11)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: *Bibliography, *Power supplies, Fuel cells, Thermoelectricity, Alkaline cells, Nuclear energy, Solar cells, Satellite vehicles, Materials, Indexes, Space flight.

A bibliography is presented with abstracts, from unclassified literature on the subject of Flight Vehicle Power. Selected references in the fields of materials are also included. All references are to primary sources. (Author)

AD-291 171 Div. 7, 26
(TISTM/ODN) OTS price $10.50

Union Carbide Consumer Products Co., Cleveland, Ohio.
INDUSTRIAL PREPAREDNESS STUDY OF SYNTHETIC MANGANESE DIOXIDE IN MASS PRODUCTION OF MILITARY DRY BATTERIES.
Final rept., 28 June 57-30 Nov 61,
by H. K. Bishop. 30 Nov 61, 56p. illus. tables, 12 refs.
(Contract DA 36-039-sc-75946)
Unclassified report

DESCRIPTORS: *Dry cells, *Manganese compounds, Military requirements, Dioxides, Production, Polarization, Manufacturing methods, Preparation, Specifications, Films, Mixtures, Tests, Electrostatic capacitance, Humidity, Voltage, Storage.

Two chemically prepared depolarizers were evaluated in BA-30, BA-270/U and BA-279/U batteries for ability to meet Mil-B-18b requirements. Following a preliminary mix formulation study, preproduction samples and pilot line quantities of the above types were prepared. Every effort was made to use present production equipment and techniques since experience gained would permit rapid conversion during time of emergency. Both materials were nearly equivalent in output, although difficulty was experienced in meeting some of the specifications. It may be possible to overcome these shortcomings by redesign of components. (Author)

AD-291 194 Div. 7, 8
(TISTE/CAM) OTS price $1.60

Hi-Q Div., Aerovox Corp., Olean, N. Y.
PRODUCTION ENGINEERING MEASURE FOR ROLLED CERAMIC CAPACITORS.
Quarterly rept. no. 5, 9 June-9 Sep 62,
by S. H. Thompson. 9 Sep 62, 14p.
(Contract DA 36-039-sc-85963)
Unclassified report

DESCRIPTORS: *Ceramic capacitors, *Manufacturing methods, Industrial equipment, Machines, Wire winding machines, Electrodes.

Effort was continued on the production engineering measure for rolled ceramic capacitors. Attention was given to the electrode painting machine and the Cerol winding machine. Preproduction samples were on test. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-289 607 Div. 8, 30
(TISTP/TL) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ESTIMATION OF THE SECOND-ORDER STATISTICS OF RANDOMLY TIME-VARYING LINEAR SYSTEMS,
by Morris J. Levin. 2 Nov 62, 42p. incl. illus. 13 refs. (Rept. no. 34G-7)
(Contract AF 19(628)500)
(AFESD TDR 62-147) Unclassified report

DESCRIPTORS: *Communications theory, *Linear systems, *Time signals, *Statistical analysis, *Statistical functions, Signal-to-noise ratio, Data, Sampling, Matrix algebra, Vector analysis, Real variables, Least squares method, Sequences, Probability.

This analysis considers the estimation of the second-order statistical characteristics of a randomly time-varying linear system by application of a known input signal and observation of the resulting output which may be obscured by additive white noise. The system is characterized by its impulse response correlation function f(tau lambda) and is approximated by a sampled-data model. It is shown that the estimation of the sampled values of f(tau lambda) is equivalent to the estimation of the parameters of the covariance matrix of a vector random variable. A least squares method is introduced which provides explicit estimates for these values in terms of the sampled input and output sequences. It is shown that these least squares estimates are unbiased and consistent under general conditions. For Gaussian noise and coherent nondetectability conditions (low input signal-to-noise ratio) the least squares estimates are a close approximation to the maximum likelihood estimates. The covariance matrix of the estimates is evaluated for this case and is found to be the same as that given by the Cramer-Rao lower bound. Both the low-pass and band-pass situations are discussed. Specific results for a periodic rectangular pulse input and pseudo-random input are given. (Author)

AD-289 668 Div. 8, 14, 26
(TISTE/CAM) OTS price $1.60

Crocker, Burbank and Co., Assn., Fitchburg, Mass.
PRODUCTION ENGINEERING MEASURE ON CAPACITOR PAPER.
Quarterly rept. no. 5, 23 June-23 Sep 62,
by C. E. Cashman and J. D. Stacy. 23 Sep 62, 12p. incl. illus. tables.
(Contract DA 36-039-sc-85970)
Unclassified report

DESCRIPTORS: *Paper capacitors, *Paper, *Manufacturing methods, Military equipment, Reliability, Quality control, Life expectancy, Test methods, Chloride, Calcium, Chemical properties, Analysis, Measurement, Production, Capacitors.

Six capacitor tissue lots were manufactured and analytically and operationally evaluated in mil-c-25c test capacitors. Three of the paper lots were made to study the effect of pH adjustment, two lots represented additions of 500 ppm calcium and 1000 ppm calcium in the papermaking process, and the sixth lot was the control, representing standard manufacturing practice for comparison. Analytical data covering the six capacitor tissue lots are presented, including quantitative flame photometric analysis for metallic elements, chloride determination, and pH measurement. Military test capacitors were fabricated from each of six capacitor tissue lots, and operationally life-tested. Three of the experimental paper lots produced improved operational reliability in the life tests. (Author)

AD-289 675 Div. 8, 9, 25
(TISTE/OHD) OTS price $5.60

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
6570 AMRL HIGH INTENSITY PURE TONE SOUND GENERATOR CAPABILITIES DURING ANECHOIC AND REVERBERANT OPERATION.
Report on Biomechanics of Aerospace Operations,
by Frederick L. Durand. Nov 62, 50p. incl. illus. tables, 10 refs.
(Proj. 7231)
(AMRL memo. no. M-17)
Unclassified report

DESCRIPTORS: *Sound generators, *Anechoic chambers, *Sound, Auditory signals, Noise, Audiofrequency, Instrumentation, Compressed air, Microphones, Energy, Power, Pressure, Experimental data, Analysis.

A high intensity siren was constructed. Although this sound source was designed to cover the frequency range from 10 c to 200 kc, this evaluation was made to establish its capabilities within the audio-frequency range. In the anechoic chamber the maximum SPL was recorded at 2.5 ft. from the tip of the cone and at frequencies above 2500 c levels of 160 to 165 db were recorded. The decrease in level beyond that point closely followed the ''inverse square law'', i.e. 6 db drop per doubling of distance. It was found that significant side lobes were present in the wave front at the lower frequencies but at higher frequencies, the directivity pattern reduced to a single centrally located lobe. The siren power output was determined to be approximately 300 watts at a rotor pressure of 3 psig except for the region near 2600 c where the power output is reduced by about half. An average sound pressure level of 140 db was achieved in a reverberation chamber (approx. 4,000 cubic feet volume) for the frequency range from 1 to 10 kc. (Author)

AD-289 688 Div. 8, 9
(TISTP/JW) OTS price $2.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
THE USE OF AN ELECTROLYTE IN MODEL MHD POWER GENERATORS,
by Eugene E. Covert and Daniel T. Nowlan.
May 62, 18p. incl. illus. tables, 3 refs.
(Technical rept. no. 37)
(Contract AF 49(638)900)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Power supplies, Generators, Electrolysis, Fluid flow, Reynolds number, Model tests.

The problems associated with the use of electrolytes in scale models for tests of MHD generators are discussed. It is concluded that the Hartmann number and fluid Reynolds number must be matched between the model and the full scale device. (Author)

AD-289 699 Div. 8, 14
(TISTW/RD) OTS price $4.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
A SOLID-STATE SELF-SCANNING DISPLAY DEVICE.
Interim technical rept.,
by M. S. Wasserman. June 62, 44p. incl. illus. tables, 6 refs. (Rept. no. TR 62-204.13)
(Contract AF 30(602)2524, Proj. 4506)
(RADC TDR 62-430) Unclassified report

DESCRIPTORS: *Display systems, Phosphors, Electric fields, Piezoelectric materials, Ceramic materials, Zirconates, Titanates, Lead compounds, Solid state physics, Sintering, Luminescence, Materials.

Materials are investigated for use in a solid-state electroluminescent display device in which the electric field for activation of the electroluminescent layer is provided by elastic waves propagated through a piezoelectric ceramic plate which serves as the substrate for the display. The work was subdivided into a search for piezoelectric ceramics with improved properties for use as the display substrate and the input transducers, the development of procedures for fabrication of thin large-area piezoelectric ceramic plates, and a search for materials for improved nonlinear resistor layers for the suppression of spurious light in the display. (Author)

AD-289 806 Div. 8, 26
(TISTE/CAM) OTS price $2.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Quarterly progress rept. no. 5, 8 June-8 Sep 62,
by Edward T. Rate. 8 Sep 62, 19p. incl. illus. table.
(Contract DA 36-039-sc-85965)
Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Manufacturing methods, Design, Electron guns, Modulation, Military requirements, Electron beams, Focusing, Distortion, Electromagnetic lenses, Quality control, Electrodes, Production.

Progress of the production engineering measure on high perveance cathode-ray tubes is reported. Construction and evaluation of experiments continued with emphasis on reducing the spot distortion and large-beam angle. Progress was made in the electron-beam preconvergence technique with the adoption of a new suppressor electrode configuration. (Author)

AD-289 814 Div. 8, 2, 25
(TISTP/JW) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 3. RADIO PHYSICS.
Quarterly progress rept., 1 July-30 Sep 62.
15 Oct 62, 8p.
(Contract AF 19(628)500)
(AFESD TDR 62-233) Unclassified report

DESCRIPTORS: *Scientific research, *Radio waves, *Radar antennas, Radar analysis, Plasma physics, Reflection, Scattering, Ionosphere, Ionospheric propagation, Low frequency, L band, Electromagnetic waves, Terrestrial magnetism.

AD-289 815 Div. 8, 30
(TISTP/JW) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 2. SYSTEMS.
Quarterly progress rept., 1 Aug-31 Oct 62.
15 Nov 62, 6p.
(Contract AF 19(628)500)
(AFESD TDR 62-232) Unclassified report

DESCRIPTORS: *Communications theory, *Infrared research, *Optics, *Analysis, Bibliography.

AD-289 840 Div. 8
(TISTW/RD) OTS price $2.60

Naval Civil Engineering Lab., Fort Hueneme, Calif.
LARGE POWER IMPULSE NOISE GENERATOR FOR EVALUATION OF RFI SHIELDING AND FILTERING,
by D. B. Clark. 19 Nov 62, 28p. incl. illus. 1 ref. (Technical note no. TN-474)
(Proj. Y-F006-09-201)
Unclassified report

DESCRIPTORS: *Noise generators, *Radio interference, *Shielding, Capacitors, Radio-frequency filters, Tests.

A unique noise generator was developed which provides a large output of impulse noise pulses with gaussian amplitude and time distribution. Filters with 100 db's of attenuation can be tested for impulse characteristics with continuous spectrum impulse noise up to 1,000 mc. Evaluation of several commercial interference filters are presented and some show greatly reduced effectiveness against impulsive noise as compared to cw specifications. The noise generator, which consists of thousands of tiny capacitors charging and discharging through spark gaps in an inert atmosphere across a 50-ohm coaxial load, provides repetition rates to 20 mc and output levels to 170 db above 1 microvolt per megacycle peak. The impulse noise output can be easily modulated to simulate natural noise sources by modulating the ac or dc driving voltage. The noise generator construction and operation are described in detail and evaluation of its performance is presented. (Author)

AD-289 854 Div. 8
(TISTM/ODN) OTS price $.75

Rome Air Development Center, Griffiss Air Force Base, N. Y.
SULFUR HEXAFLUORIDE IN HIGH-POWER MICROWAVE SYSTEMS,
by Vincent Vannicola. Nov 62, 17p. incl. illus. table, 9 refs. (Rept. no. RADC TDR 62-443)
(Proj. 4506)
Unclassified report

DESCRIPTORS: *Waveguides, *Sulfur compounds, *Fluorides, *Radiofrequency power, Dielectrics, Gases, Electric arcs, Contamination, Mixtures, Temperature, Pressure, Voltage.

Sulfur hexafluoride is being used extensively as a means of obtaining high peak power performance in waveguide systems. There is reason to believe that optimum efficiency is not currently being achieved in waveguide systems using this electronegative gas. This report reviews that available data on the use of SF6 in microwave systems. Inconsistencies in these data are noted. For example, power ratios (breakdown power of SF6 over that of air at normal pressures with all other parameters constant) are reported from a low of 3 to a high of 40. The mechanisms of these inconsistencies are discussed in terms of geometric configuration, contamination, localized hot spots, localized torona discharge, etc. Areas of future investigation are discussed. (Author)

AD-289 896 Div. 8
(TISTM/BRW) OTS price $1.10

General Dynamics/Electronics, San Diego, Calif.
APPLICATION OF NEW MATERIALS AND TECHNIQUES IN ELECTRON GUN FABRICATION.
Interim development rept., 1 July-30 Sep 62.
30 Oct 62, 8p. incl. illus. table.
(Contract NObsr-81208)
Unclassified report

DESCRIPTORS: *Electron guns, Cathode ray tubes, Cylindrical bodies, Manufacturing methods, Molding, Machining, Materials, Mica, Production.

The complete cylinder approach to electron gun fabrication has proved impractical and further effort in this direction does not appear justified. (Author)

AD-290 206 Div. 8
(TISTE/CAM) OTS price $2.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
AC TEMPERATURE COMPENSATION OF INTEGRATED AMPLIFIERS,
by James D. Meindl, and Octavius Pitzalis, Jr.
Sep 62, 23p. incl. illus. tables, 7 refs.
(AERDL technical rept. no. 2307)
Unclassified report

DESCRIPTORS: *Transistor amplifiers, Design, Temperature, Sensitivity, Electronic circuits, Impedance, Voltage, Electric currents, Resistance, Mathematical analysis, Theory.

Effort is expended towards an analytical basis for temperature compensation of the AC performance of transistor small-signal amplifiers. Described is a simple, accurate design theory in which this compensation is analytically determined by imposing the requirement of equality for the values of the individual small-signal four-pole parameters of the amplifier at its operating temperature limits. For values of T between -30 and +100 C in a typical noncompensated circuit, power gain, input impedance and output impedance vary by 99%, 71%, and 22%, respectively, while the comparable compensated circuit variation of each of these quantities is less than 9%. In an integrated circuit a single tapped resistance, properly selected, is the temperature sensitive element required for this compensation. (Author)

AD-290 209 Div. 8, 25, 14
(TISTM/EJH) OTS price $1.10

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 26 Feb 62, 5p. 14 refs.
(Scientific rept. no. 15)
(Contract AF 19(604)4093, Proj. 4619)
(AFCRL-62-110) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Thermionic emission, *Diodes, *Electron tubes, Refractory materials, Tungsten, Barium compounds, Silicates, Zirconium compounds, Hydrides, Calcium compounds, Carbonates, Work functions, Barium, Evaporation, Temperature.

The effective work function of a dispenser cathode was measured at an operating temperature using a close-spaced diode. Life tests, instantaneous evaporation rates and pulsed emission measurements were made on a tungsten-barium orthosilicate dispenser cathode. A summary of the pertinent results of this investigation is given along with speculations on the emission mechanism. (Author)

AD-290 210 Div. 8, 25, 14
(TISTM/EJH) OTS price $2.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 27 June 62, 18p. incl. illus. tables, 10 refs. (Scientific rept. no. 2)
(Contract AF 19(628)279, Proj. 4619)
(AFCRL 62-513) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Thermionic emission, *Electron tubes, Refractory materials, Tantalum compounds, Barium compounds, Silicates, Tungsten compounds, Molybdenum compounds, Silicides, Work functions, Evaporation, Barium, Life expectancy, Electric currents.

Life tests, work function, and evaporation rate measurements are discussed. The barium orthosilicate cathode is nearing 6000 hours at 1 a/sq cm. The work function of tantalum silicide was measured and is very close to the value for Ta, 4.06 + 2 x 10 to the -4th power T ev. An analysis is included of the requirements and the limitations of high current density emitters. (Author)

AD-290 211 Div. 8, 25, 14
(TISTM/EJH) OTS price $1.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 28 Nov 61, 8p. incl. tables, 4 refs. (Scientific rept. no. 14)
(Contract AF 19(604)4093, Proj. 4619)
(AFCRL-1114) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Thermionic emission, *Diodes, *Electron tubes, Refractory materials, Tungsten, Barium compounds, Silicates, Zirconium compounds, Hydrides, Calcium compounds, Carbonates, Titanates, Barium, Evaporation, Work functions.

A number of dispenser cathodes were tested in this investigation that exhibit the low work functions necessary for high-current density cathodes. Precautions may be taken to keep the evaporation rate at an acceptable level. These results suggest that a wide choice is possible in the materials capable of producing a barium dispenser cathode. (Author)

AD-290 277 Div. 8
(TISTE/OHD) OTS price $3.00

Battelle Memorial Inst., Columbus, Ohio.
DETERMINATION OF REQUIREMENTS FOR OVERVOLTAGE AND OVERLOAD PROTECTION OF TRANSISTORS.
Final engineering rept., 20 May 59-9 Dec 60,
by H. T. Gruber and S. T. Klapp. 9 Dec 60, 188p. incl. illus. tables.
(Contract NObsr-77579)
Unclassified report

DESCRIPTORS: *Transistors, *Voltage, *Electric currents, Transients, Thermal stresses, Reliability, Electronic circuits, Limiters, Suppressors, Electronic equipment, Radiofrequency pulses, Pulse analyzers, Measurement, Mathematical analysis, Circuits, Electrical networks, Resistors, Capacitors, Cooling, Experimental data.

Design requirements for transistor protective devices were determined. The exact nature of the protective devices is not to be determined as they may be either additional devices incorporated in the circuit, additional protective circuits, or the proper choice of the basic circuit parameters. Desired are discrete values of voltage, current, power, time constants, and any other necessary parameters that an equipment designer might readily use. The following recommendations are made as a result of the work performed: (1) more adequate transistor specifications are required, such as specifications which describe transistor operation at several temperatures rather than the present 25 C only; (2) transistor manufacturers should supply more thermal information about their products; (3) further work should be performed for the express purpose of designing the equipment necessary to determine accurately the thermal response of transistor junctions; and (4) further work should be performed for the express purpose of designing the equipment necessary for a more accurate transistor thermal analog. (Author)

AD-290 290 Div. 8, 30, 25
(TISTP/JW) OTS PRICE $19.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 67 for period ending 31 Aug 62,
by H. J. Zimmerman, G. G. Harvey and W. B. Davenport, Jr. 15 Oct 62, 283p. incl. illus. tables.
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000, Contract AF 19(604)5992 and others)
Unclassified report

DESCRIPTORS: *Microwaves, *Hyperfine structure, *Radio astronomy, *Plasma physics, *Communications theory, *Neurology, *Masers, *Molecular beams, *Acoustics, *Magnetohydrodynamics, *Speech, Ionization, Diodes, Thin films, Phonons, Modulation, Photoreceptors, Circuits, Information theory, Lenses, Cesium, Superconductivity, Rare earths, Ion beams, Biophysics, Perturbation theory, Bibliography.

AD-290 310 Div. 8, 17, 22
(TISTW/PCR) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept. no. 3, 1-30 Sep 62,
by Paul F. Mohrbach and Robert F. Wood.
30 Sep 62, 25p. incl. illus. tables (Rept. no. P-B1981-3)
(Contract N178-8087)
Unclassified report

DESCRIPTORS: *Ferrites, *Radiofrequency, Carbonyl radicals, Iron compounds, Attenuation, Radiofrequency attenuators, Metallic compounds, Ceramic materials, Explosives, Powder metals, Lubricants, Binders, Molding, Production, Instrumentation, Electromagnetic effects, Wetting agents, Stainless steel, Wire, Borium compounds, Titanates, Dielectrics, Insulating materials, Equations, Manufacturing methods, Hazards.

Evaluation of data obtained from carbonyl iron samples made over the past five years is being pursued to determine how the attenuating characteristics of the material can be maximized. Data are presented which show the close correlation of calculated values of attenuation with actual measured values for a F-D ferrite. Using certain assumptions, a preliminary theoretical model is presented, which defines the values of the parameters to give desired values of attenuation. The use of a binder-lubricant and wetting agent has facilitated the molding of ferrite powders without danger of cracking. A pre-sintering operation is being employed to control shrinkage of the samples during firing. Stainless steel wire has been successfully coated with a stable suspension of barium titanate in acryloid resin and xylene solvent. Dielectric constants from 5 to 25 have been obtained using various heat treatments. Voltage breakdown values range from 50 to 150 volts per mil. (Author)

AD-290 311 Div. 8
(TISTW/RD) OTS price $2.60

Electronic Defense Lab., Mountain View, Calif.
WJ-211 EVALUATION REPORT,
by Henry J. Bielefeld. 1 Oct 62, 18p. incl. illus. tables, 2 refs. (Technical memo. no. EDL-M485)
(Contract DA 36-039-sc-87499)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Design, Tests, Noise (Radio), Test equipment, S band.

A WJ-211 low-noise, S-band, traveling wave amplifier tube is described. The tube is evaluated with respect to its usefulness for receiver applications; bandwidth, noise figure, linear dynamic range, and local oscillator (LO) radiation suppression are considered. (Author)

AD-290 346 Div. 8
(TISTW/RD) OTS price $10.50

Electronic Defense Labs., Mountain View, Calif.
FIFTY-KILOVOLT HARD-TUBE MARX-CIRCUIT PULSE MODULATOR,
by R. Fred Nylander. 24 Sep 62, 127p. incl. illus. tables, 6 refs. (Technical memo. no. EDL-M387)
(Contracts DA 36-039-sc-87475 and DA 36-039-sc-87499)
Unclassified report

DESCRIPTORS: *Modulators, *Modulator tubes, *Pulse modulation, Electrostatic capacitance, Switching cirucits, Voltage amplifiers.

A description of a voltage-doubling pulse modulator employing vacuum-tube switch elements is given. Also described are several novel techniques incorporated in the driver circuitry for the modulator. In addition, modulator operation based on predicted values of stray capacitance is analyzed, and the analysis compared with the results of experimental evaluation of a model capable of producing pulse groups having an amplitude of 50 kilovolts at 20 amperes. The feasibility of this approach for providing pulse-group modulation at voltages exceeding 100 kilovolts is demonstrated. (Author)

AD-290 498 Div. 8, 20
(TISTE/OHD) OTS price $7.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
STUDY TO DETERMINE EFFECTS OF FISSION PRODUCT GAMMA RADIATION ON ELECTRONIC PARTS AND EQUIPMENT.
Progress rept. no. 2, 1 June-31 Aug 62,
by R. M. Magee, D. A. Courtios, and D. D. Majeske. Sep 62, 67p. incl. illus. tables (Rept. no. BSC-34454)
(Contract NObsr-87267)
Unclassified report

DESCRIPTORS: *Radiation damage, *Electronic equipment, *Electronic circuits, Dosimeters, Gamma rays, Test facilities, Temperature control, Printed circuits, Waveform generators, Transistors, Reliability, Pulse amplifiers, Experimental data.

The effects of gamma radiation on circuit cards were investigated. Three types of circuit cards were tested in gamma ray environments up to 3 x 10 to the 5th power r/hr and up to total doses of 1.5 x 10 to the 4th power roentgens. No significant effects on the performance of these circuit cards were observed. (Author)

AD-290 511 Div. 8
(TISTW/RD) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE INFLUENCE OF TERRAIN SHIELDING ON RADIO WAVE PROPAGATION AT 8000 Mcps,
by W. E. Morrow, Jr., D. Karp and others.
20 Nov 62, 2p. illus. (Rept. no. 36G-1)
(Contract AF 19(628)500)
(AFESD TDR 62-236) Unclassified report

DESCRIPTORS: *Radio waves, *Radio transmission, Propagation, Attenuation, Shielding, Terrain, X band.

AD-290 512 Div. 8
(TISTW/RD) OTS price $8.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AIR LOADS AND PRESSURE DISTRIBUTION ON A PARABOLIC ANTENNA MODEL,
by Joseph Bicknell, Raffi Yeghiayan. 30 Oct 62, 88p. incl. illus. tables (Rept. no. 71G-5)
(Contract AF 19(628)500)
(AFESD TDR 62-235) Unclassified report

DESCRIPTORS: *Parabolic antennas, *Radar antennas, Wind tunnels, Wind tunnel models, Pitch, Roll, Yaw, Lift, Drag, Moments, Pressure, Model tests, Aerodynamics, Load distribution.

A series of tests on a parabolic scanner model was conducted for the M.I.T. Lincoln Laboratory at the Wright Brothers Wind Tunnel at M.I.T. during the periods October 13, 1961, to January 2, 1962, and May 25 to June 1, 1962. The wind tunnel is a low subsonic velocity test facility with an elliptic test section measuring 7 1/2 x 10 feet. The purpose of the experimental investigation was to determine the airloads - pitching, rolling and yawing moments, lift, drag, and sideforce - on a parabolic reflector with a simulated screen and a solid surface and to determine the pressure distribution on the solid surface reflector. (Author)

AD-290 517 Div. 8, 2
(TISTP/JW) OTS price $10.50

United Aircraft Corp., East Hartford, Conn.
METEOROLOGICAL RADAR SET AN/FPS-68. PART I. CATEGORY I TESTS AT MAYNARD. PART II. ACCEPTANCE TESTS AT HANSCOM FIELD.
Report on Weather Observing and Forecasting System 433L.
30 Oct 62, 1v. incl. illus. tables, refs. (Rept. no. WSC E-20)
(Contract AF 19(626)16)
Unclassified report

DESCRIPTORS: *Radar equipment, *Meteorological radar, Test methods, Tests, Quality control.

The results of Category I tests performed on the first (Navy designed) Meteorological Radar Set, AN/FPS-68 received for evaluation by the Air Force are provided in Part I of this report. Details of the acceptance tests performed on a second unit received for evaluation are given in Part II. Both radars exhibited evidence of limited quality control during manufacture and both units required prolonged periods of shakedown and rework before functioning in an operational manner. Component performance is measured and reported herein as well as subsystem and system performance. Significant test results are fully detailed so that analysis of these results easily leads to those recommended areas of redesign and re-engineering required to provide operation similar to that envisioned for the Air Force AN/FPS-77. (Author)

AD-290 628 Div. 8, 30
(TISTE/OHD) OTS price $2.75

Sylvania Electronic Systems, Needham, Mass.
SUBMICROSECOND SIMULATION COMPUTER STUDY PROGRAM. PART II. PRELIMINARY DESIGN AND SYSTEM SYNTHESIS.
Final rept., 1 Nov 61-30 Apr 62 on Training Equipment, Simulators, and Techniques for Air Force Systems,
by Edward L. Perry. Oct 62, 126p. incl. illus. tables, 18 refs.
(Contract AF 33(616)8092, Proj. 6114)
(MRL TDR 62-27, pt. 2) Unclassified report

DESCRIPTORS: *Computers, *Digital computers, *Flight simulators, Simulation, Switching circuits, Triggered gates, Timing circuits, Pulse counters, Electronic circuits, Design, Memory devices, Magnetic cores, Magnetic effects, Thin films, Data storage systems, Data processing systems, Programming, Computer logic.

The results of research to determine the preliminary design and system configuration of a high-speed simulation computer are described. Bench tests and analytical study of circuits have shown that the propagation delay through the basic diode-transistor NAND logic circuit will be approximately 4 nanoseconds. The memory study and tests have supported the use of ferrite cores for the storage of bulk program data. These cores may be sensed non-destructively at a two-megacycle rate by means of a flux-direction sensing technique. A fast scratch-pad memory is provided to compensate for the characteristically slow writing rate (250kc) associated with the non-destructive read-out memory. The computer described is designed to achieve a 0.75-us floating point addition operation time using these circuits and memories. Memory quantity may be specified in module sizes of 4 thousand words. (Author)

AD-290 696 Div. 8
(TISTP/FR) OTS price $14.50

California U., Riverside.
TABLES OF NON-RELATIVISTIC ELECTRON TRAJECTORIES FOR FIELD EMISSION CATHODES,
by Allan M. Russell. Oct 62, 205p. incl. illus. tables, 3 refs. (Technical rept. no. 3)
(Contract Nonr-184202, Proj. NR 017-441)
Unclassified report

DESCRIPTORS: *Particle trajectories, *Electrons, *Field emission, Cathodes (Electron tubes), Mathematical analysis, Digital computers, Programming, Tables.

AD-290 739 Div. 8
(TISTE/CAM) OTS price $6.60

Radio Corp. of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 1, 1 June-31 Aug 62,
by G. Hodowanec, C. Bacher and R. McMurrough. 31 Aug 62, 55p. incl. illus. 22 refs.
(Contract NObsr-87535, Proj. SR008-03-4)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Design, Ceramic materials, X band, Noise (Radio) , Reduction, Waveguide couplers, Helixes, Focusing, Measurement, Magnets, Secondary emission, Video amplifiers, Video signals, Packaging, Linear systems, Standing-wave-ratio, Tests, Detectors, Limiters.

Work is described to design and develop a low-noise, multiple-function, X-band traveling-wave tube. Work consisted largely of design studies and exploratory experiments aimed at arriving at the simplest, most reliable design for a tube capable of meeting the objective specifications of the program. The main emphasis was placed on the design and fabrication of the low-noise, linear-output section of the proposed tube and the novel limited-video-output section of the tube. Concurrently, periodic-permanent-magnet-focusing techniques were evaluated and the problem of converting the potential tube designs to metal-ceramic structures was studied. Special effort was expended in the design of the waveguide couplers and the slow-wave helix structures to obtain the required tube bandwidth, reduce tube losses, and achieve flexibility in electrical and mechanical adjustments in tubes of metal-ceramic construction. (Author)

AD-290 740 Div. 8
(TISTE/CAM) OTS price $9.10

Sperry Microwave Electronics Co., Clearwater, Fla.
FILTER, BANDPASS F-( )/GP.
Final technical rept.,
by D. C. Scott and W. C. Heithaus. 21 June 62, 1v. incl. illus. 19 refs. (Rept. no. SJ220-0025B-6)
(Contract AF 30(602)2062)
(RADC TDR 62-342) Unclassified report

DESCRIPTORS: *Band-pass filters, *Waveguides, Resonance absorption, S band, Low pass filters, Standing wave ratios, Model tests, Radiofrequency attenuators, Waveguide couplers, Ferromagnetic materials, Cavity resonators, Transmission lines, Suppressors, Measurement, Design, Experimental data.

Development of an experimental high power S-band spurious harmonic filter, designated as filter, bandpass F-( )/GP, is completed. An experimental model of the filter was built. This filter combines a multiple cavity bandpass filter, a ferrite isolator, a resonant ferrite signal suppressor, and a leaky wall harmonic filter. The composite characteristics of these components provide sharp selectivity, low passband VSWR and insertion loss, high power capacity, and attenuation of the order of 100 db for all frequencies and modes in the reject bands. Advanced techniques investigated during the program included the use of subsidiary ferromagnetic resonances; natural resonances in materials with controlled h-anisotropy and magnetization; and coupled wave techniques for absorbing signals

in the reject band. Evaluation of the unit included a test in a resonant ring apparatus at 10 megawatts peak, which the unit passed successfully. (Author)

AD-290 749 Div. 8, 24
(TISTE/OHD) OTS price $8.60

Fairchild Camera and Instrument Corp., Syosset, N. Y.
SCREENING VIEWER.
Final technical rept.
5 Dec 61, 94p. incl. illus. tables (Technical rept. no. SME-BG-2-7)
(Contract AF 30(602)2535)
Unclassified report

DESCRIPTORS: *Film readers, *Film projectors, Electronic circuits, Electronic drives, Full-wave rectifiers, Focusing, Control systems, Servo systems, Servomechanisms, Lenses, Optical systems, Mathematical analysis, Design, Mirrors, Feedback, Functions, Drive sprockets, Mechanical drives, Variable-speed drives, Amplifiers, Incandescent lamps, Photographic film, Power transmission belts, Wiring diagrams.

This final technical report on the screening viewer covers three phases: electrical controls, Mylar belt studies, and optical system. The report on the Electrical Controls describes the power input, magnification control system, the film transport circuitry, lamp control, and design improvements incorporated during assembly. The studies on the Mylar belt describe the film flattening technique used in the viewer, belt tracking, adverse effects of flexible roller mountings, test results on the Mylar belt drive and on Mylar belt life. The optical system report describes the type of system used and an evaluation of the merits as well as shortcomings inherent in such a system. (Author)

AD-290 771 Div. 8, 26
(TISTE/CAM) OTS price $5.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
Quarterly rept. no. 5, 1 June-31 Aug 62,
by R. Clarke, W. M. Wilson and D. Treleaven. ed. by B. Rappaport. 31 Aug 62, 56p. incl. illus. tables (PSI rept. no. TE 4000:15-Q-5)
(Contract DA 36-039-sc-85960)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Silicon, Processing, Scheduling, Quality control, Preparation, Diffusion, Encapsulation, Metal coatings, Test equipment, Test methods, Production.

Pilot line operation was established in all areas of fabrication. Processes are geared to production quantities for preparation of pre-production samples with a gradual increase toward the pilot production rate needed to produce the 2,000 pilot production samples. The 100 pre-production samples were assembled and evaluation of the devices has begun. A test schedule for evaluation of the samples was prepared and submitted. The fabrication processes are discussed and the material flow is presented. (Author)

AD-290 775 Div. 8
(TISTE/OHD) OTS price $7.60

Naval Ordnance Lab., White Oak, Md.
THE NATURE OF MICROWAVE PARAMETRIC AMPLIFICATION,
by Edward T. Hooper, Jr. 5 Sep 62, 71p. incl. illus. tables, 40 refs. (Rept. no. NOLTR 62-102)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Modulation, *Theory, Feedback amplifiers, Feedback, Phase shifters, Phase modulation, Sidebands, Amplifiers, Electron tubes, Masers, Transistors, Diodes, Semiconductors, Microwave frequency.

The principles of parametric amplification are discussed. Included are the conservation theorems that place restraints on powers at various frequencies, feedbacks operating internally, the physical mechanisms of pumping resonant circuits, and the physical mechanisms of pumping and coupling in propagating systems. The treatment is theoretical in nature. Known laws and relations are surveyed and the theory is extended to include the nature of the feedback, pumping, and coupling mechanisms. Feedback is found to be positive for the lower-sideband three frequency parametric amplifier, but also positive for the upper-side-band case where limited gain results from the feedback loop gain being less than unity. An entire spectrum of permitted pumping frequencies below the system resonant frequency, as well as above, has been found. Although the results are applicable to all parametric amplifiers, illustrations are taken from amplifiers in the microwave frequency range. (Author)

AD-290 782 Div. 8
(TISTE/OHD) OTS price $7.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE ANALYSIS AND SYNTHESIS OF RC SYNCHRONOUS NETWORKS,
by Bernard M. Tobin. 5 June 62, 172p. incl. illus. tables, 26 refs. (Research rept. no. PIBMRI-1016-62)
(Contract AF 18(603)105)
(AFOSR-2770) Unclassified report

DESCRIPTORS: *Electrical networks, *Control systems, *Servo systems, Data transmission systems, Theory, Analysis, Resistors, Switching circuits, Electronic switches, Transformations (Mathematics), Mathematical analysis, Matrix algebra.

A major problem in the field of a-c control systems is the synthesis of suitable electrical compensating networks which operate on the envelopes of modulated signals. Classical time-variant compensating networks suffer from a number of disadvantages. RC synchronous networks in which the basic reactive elements are synchronously-switched capacitances whose current polarities reverse periodically at twice the carrier frequency overcome these drawbacks. Although successful single capacitance synchronous networks have been constructed an exact theory upon which a logical synthesis procedure can be based has been lacking. A unified theory of analysis and synthesis of RC synchronous networks is presented. The theory leading to a rigorous procedure for synthesizing an RC synchronous network which realizes a prescribed envelope voltage transfer function is developed. (Author)

AD-290 791 Div. 8, 26
(TISTE/CAM) OTS price $3.60

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 1, 19 June-30 Sep 62,
by J. D. Marshall. 30 Sep 62, 30p. incl. illus.
(Contract DA 36-039-sc-86738)
Unclassified report

DESCRIPTORS: *Triodes, *Manufacturing methods, Design, Ultra high frequency, Ceramic materials, Processing, Test equipment, Life expectancy, Electron tube heaters, Cathodes (Electron tubes), Coatings, Seals, Quality control, Tungsten alloys, Rhenium alloys, Wire, Experimental data, Vacuum seals, Vacuum systems, Radiofrequency oscillators, Radiofrequency amplifiers, Production.

The ceramic triode production engineering measure is discussed. Objectives are: (1) to provide improved vacuum exhaust equipment for processing 7486 tubes; (2) to improve tube ratings by evaluation on new test equipment; (3) to increase tube life expectancy by improved tube design features; and (4) to demonstrate 100 tube per day production capability. (Author)

AD-290 822 Div. 8
(TISTE/CAM) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).
Monthly progress rept. no. 9, 6 Nov-7 Dec 62.
7 Dec 62, 5p.
(Contract AF 33(604)39443)
Unclassified report

DESCRIPTORS: *Radiofrequency spectrum analyzers, *Frequency converters, *Radar jamming, Ground support equipment, Test equipment, L band, S band, Measurement, Test sets.

work accomplished from 6 November to 7 December 1962 on the design and development of a broadband spectrum analyzer, converter measuring, frequency S, and converter measuring, frequency L is described. The spectrum analyzer contains ten wired boards and ten subchassis assemblies and is packaged in a combination case 19 inches wide, 19 inches high, and 27 inches deep. All wired boards slide into frames in various positions around a five-inch cathode ray tube. Cooling of the analyzer is accomplished by two fans, one of which has access to outside air. Primary power input is 115 V a-c ±5%, 380-420 cps, single phase. The weight of the unit in transit condition, less the converter, is 111 pounds. (Author)

AD-290 841 Div. 8
(TISTE/CAM) OTS price $4.60

Northwestern Technological Inst., Evanston, Ill.
SOLID STATE ANALOG-TO-DIGITAL CONVERTER.
Quarterly progress rept. no. 2, Aug-Oct 62,
by Paul G. Sedlewicz and Robert E. Onley.
Oct 62, 44p. incl. illus. refs. (Memo. no. 374)
(Contract NOw 62-0749-d)
Unclassified report

DESCRIPTORS: *Analog-to-digital converters, *Semiconductors, Solid state physics, Feasibility studies, Distortion, Electric currents, Voltage, Electron beams, Surface properties, Processing, Measurements, Crystals.

Problems related to device design were investigated, especially those of distortion and injection. A qualitative description of field, injected carrier, and contact distortion is presented. Experimental results show that electron injection causes the major distortion to the potential of the depletion region on the surface of the bevel. The injection of electrons and holes from a metal-depletion layer contact is presented, and is shown not to have the characteristics of space-charge limited current. A circuit diagram and characteristics of the device in its first stage are presented. (Author)

AD-290 950 Div. 8, 25, 30
(TISTE/OHD) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS PROGRAM. ELECTRONIC PROPERTIES OF THIN FILMS.
Semiannual technical rept., 1 Jan-30 June 62,
by F. Vernon, Jr. Oct 62, 13p. incl. illus.
4 refs. (Rept. no. TDR-69(2250-12)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-197) Unclassified report

DESCRIPTORS: *Thin films, *Metal films, *Dielectric films, *Cryogenics, Superconductivity, Negative resistance circuits, Lead alloys, Aluminum alloys, Aluminum compounds, Oxides, Tin alloys, Barium compounds, Stearates, Monomolecular films, Manufacturing methods, Structures.

Research experiments into methods of forming structures suitable for the observation of tunneling phenomena are presented. Metallic films of tin, indium, aluminum, gold, permalloy, lead, and silicon monoxide were successfully deposited for several experiments. Dielectric films of aluminum oxide and barium stearate were successfully fabricated. (Author)

AD-291 029 Div. 8, 26
(TISTE/OHD) OTS price $3.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 1, 14 May-14 Aug 62,
by W. J. Noroski. 14 Aug 62, 32p. incl. illus. tables.
(Contract DA 36-039-sc-86731)
Unclassified report

DESCRIPTORS: *Manufacturing methods, *Electron beams, *Electron tubes, Cathode ray tubes, Photoengraving, Vapor plating, Vacuum apparatus, Thin films, Metal films, Chemical milling, Beryllium alloys, Copper alloys, Nickel alloys, Chromium alloys.

Evaluation of a vacuum-metallizing technique for manufacturing deflectron units was made. The model chosen as a test vehicle for the process is being designed. Suppliers of cone structures and evaporation masters were contacted. (Author)

AD-291 100 Div. 8, 2
(TISTP/TL) OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
ANALYSIS OF LOW FREQUENCY IONOGRAMS FROM STEEP GRADIENT PROFILES,
by A. J. Ferraro and C. P. Tou. 1 Dec 62, 38p.
incl. illus. 14 refs. (Scientific rept. no. 174)
(Contract AF 19(604)8012, Proj. 8605)
(AFCRL 62-1063) Unclassified report

DESCRIPTORS: *Radio interference, *Ionosphere, *Low frequency, *Radio waves, Polarization, Sheets, Electrons, Absorption, Ionosphere models, Density, Reflection.

The phenomenon of interference fringes on swept low frequency polarization records were interpreted as formed from two overlapping echoes. On further examination, this was found to be inadequate to explain the phenomenon. The interference fringes are interpreted as formed from the waves of two different modes reflected by a high gradient sporadic layer in the E-region. This interpretation has shown satisfactory agreement with the experimental data. (Author)

AD-291 110 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
STEP-STRESS AS AN INDICATOR FOR MANUFACTURING PROCESS CHANGES,
by Edward B. Hakim. Nov 62, 16p. incl. illus. ref. (AELRDL technical rept. no. 2294)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Failure (Mechanics), Temperature, Test methods, Processing, Life expectancy, Thermal stresses, Experimental data, Aging.

A new application for step-stress testing of transistors is proposed. Detection of manufacturing process changes which will affect transistor reliability is done by using the step-stress technique. From the curves obtained by plotting % failures vs inverse absolute temperature, it was possible to observe changes in device construction without prior knowledge from the manufacturer. A summary of the step-stress method is given, as well as the approach used in this work, including several examples. (Author)

AD-291 167 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Itek Corp., Waltham, Mass.
PRODUCTION ENGINEERING MEASURES FOR QUARTZ CRYSTAL FILTER UNITS AT 15MC, 20MC, 20.55MC, 25MC, 30MC.
Quarterly rept. no. 5, 1 June-30 Sep 62,
by R. G. Kinsman. 30 Sep 62, 12p. incl. illus. (Contract DA 36-039-sc-85962)
Unclassified report

DESCRIPTORS: *Crystal filters, *Manufacturing methods, Design, Quartz crystals, High frequency, Printed circuits, Production.

The design of the 30mc filters was finalized. Engineering units were fabricated and met all phases of the specification. The 20.55mc filter design is complete based on getting a specification change with regards to spurious. Some engineering units were completed. (Author)

AD-291 174 Div. 8, 26
(TISTE/CAM) OTS price $7.60

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept. no. 1, 30 Apr-31 July 62, 36p. incl. illus. tables.
(Contract DA 36-039-sc-86724)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Processing, Preparation, Experimental data, Cleaning, Alloys, Coatings, Surfaces, Seals, Temperature, Cooling, Life expectancy, Production, Reliability.

Effort is described on the production engineering measure for the improvement of germanium alloy power transistors. A jet rinse fixture was designed and built. Included are resistivity cells for the continuous monitoring of the purity of the water at the inlet and outlet. The fixture was connected to a recirculating Barnstea system. An oven was set up for the steam oxidation of power transistors. A silaning fixture was designed and constructed which will permit deposition of a silane film on the die while keeping the weld ring clean. A silaning system was constructed. The injection alloying fixture was extensively modified. In particular, it is now possible to apply uniform pressure for a preset time to the molten indium. Equipment was installed so that a programmed temperature cycle can be established. Fixtures for helium leak detection were designed and built. 380 positions were installed for the cut-off life test at elevated temperature. Ovens having close temperature control were set up for accelerated life tests. (Author)

AD-291 192 Div. 8
(TISTE/OHD) OTS price $7.60

Army Signal Radio Propagation Agency, Fort Monmouth, N. J.
AN ANALYTICAL METHOD OF OBTAINING RECEIVED INPUT VOLTAGES, REQUIRED INPUT VOLTAGES, LUFS AND MUFS,
by G. E. Krause, L. C. Kelley, and S. E. Probst. Sep 53, rev. May 60, 72p. incl. illus. table. (Proj. 536)
Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Propagation, *Radio reception, Analysis, Radiofrequency, Trigonometry, Radio communication systems, Radio signals, Absorption, Antennas, Noise (Radio).

A step-by-step analytical method is presented, which is used in predicting receiver input voltages, required input voltages, lowest useful high frequencies, and maximum usable frequencies. It was originally written as an informal document for a twofold purpose: (1) background for training of personnel, and (2) as a first approach to the detailed understanding required by personnel who want to reduce these techniques to electronic computer programs. Considerable interest has been expressed in this document and the decision to publish it has resulted. (Author)

9. FLUID MECHANICS

AD-289 689 Div. 9
(TISTP/JW) OTS price $2.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
THE FLUID MOTION IN A HELIX,
by Charles J. Bartlett. Apr 62, 20p. incl. illus. 4 refs. (Technical rept. no. 36)
(Contract AF 49(638)900)
Unclassified report

DESCRIPTORS: *Fluid flow, *Helixes, Compressible flow, Secondary emission, Instrumentation, Measurement, Reynolds number, Differential equations.

An approximate solution for the flow in a helical tube with a square cross section is presented. It is shown that the predicted onset of secondary flow effects is compatible with the measured effect. (Author)

AD-289 693 Div. 9, 1
(TISTA/GEC) OTS price $8.60

Bell Aerosystems Co., Buffalo, N. Y.
STUDY OF FLEXIBLE JET EXTENSIONS FOR GROUND

EFFECT MACHINES.
Nov 62, 90p. incl. illus. tables, 17 refs.
(Rept. no. 2131-920001)
(Contract Nonr-384700)
Unclassified report

DESCRIPTORS: *Flying platforms, Design, Aerodynamic configurations, Nozzles, Jets, Structures, Stability, Effectiveness, Model tests, Lift, Aerodynamics, Ground effect.

The results are presented of a study of flexible jet extensions for Ground Effect Machines. A relatively simple trunk design can give a considerable increase in the effective clearance height of a jet with only a small loss in stability. An analysis was made of the optimum jet extension configuration and the possible types of materials and fabrication procedures. Two dimensional model tests were carried out with varying jet wall extension lengths, and an optimum arrangement for lift efficiency and stability determined. The most promising technique and method were selected for application to the Navy Hydroskimmer, SKMR-1. A typical section of the proposed jet extension was tested and a comparison made between the original SKMR-1 performance with a flat bottom and with jet extensions. (Author)

AD-289 881 Div. 9, 1
(TISTA/GEC) OTS price $1.25

Aerojet-General Corp., Azusa, Calif.
RELATIONSHIP BETWEEN FLUTTER PARAMETERS AND GENERALIZED AERODYNAMIC FORCES FOR WINGS OF LOW ASPECT RATIO.
Rept. no. 5 (Final) June 60-July 62 on Dynamic Problems in Flight Vehicles,
by Bernard Mazelsky and Harry B. Amey, Jr.
Sep 62, 38p. incl. table, 2 refs. (Rept. no. 2249)
(Contract AF 33(616)7420, Proj. 1370)
(ASD TDR 62-462) Unclassified report

DESCRIPTORS: *Triangular wings, Aerodynamics, Elasticity, Aspect ratio, Mathematical analysis, Perturbation theory, Subsonic flow, Pitch, Roll, Damping, Structures, Supersonics, Hypersonics, Transonics, Flutter.

A set of closed-form approximations is derived which relates the flutter conditions of a wing to its generalized aerodynamic forces. A simplified two-mode analysis is used to obtain a first-order approximation. More general analyses are performed by treating additional effects as perturbations. The derivations are applicable to a wide class of low-aspect-ratio wings and apply to subsonic, transonic, supersonic, and hypersonic flow. (Author)

AD-289 882 Div. 9, 1
(TISTA/GEC) OTS price $1.25

Aerojet-General Corp., Azusa, Calif.
APPLICATION OF THE NASA KERNEL-FUNCTION PROCEDURES TO GENERALLY DEFORMING WINGS.
Rept. no. 4 (Final) June 60-Apr 62 on Dynamic Problems in Flight Vehicles.
Oct 62, 38p. incl. illus. tables, 3 refs. (Rept. no. 2214)
(Contract AF 33(616)7420, Proj. 1370)
(ASD TDR 62-409) Unclassified report

DESCRIPTORS: *Triangular wing, Aerodynamics, Deformation, Supersonics, Elasticity, Aspect ratio, Subsonic flow, Vibration, Mathematical analysis, Theory, Gas flow, Integral equations, Lift, Flutter.

A method is described for obtaining generalized aerodynamic forces by utilizing the NASA Kernel-Function Procedures. An evaluation of the generalized aerodynamic forces and the consequent flutter conditions is made for the particular case of a uniform, cantilevered, 70 degree delta wing. The supersonic Kernel-Function Procedure was found to be inadequate for treating the elastic modes on this low-aspect-ratio wing; the subsonic procedure, however, appears to work satisfactorily. The theoretical flutter predictions are compared with the experimental results of NASA Report TM X-53 (AD-222 902). The Kernel-Function predictions for quasi-steady flow (k approaches 0) appear to be superior to those for the complete unsteady case k = omega sub fc sub r/2V sub f. Based on this limited comparison, it appears that for this low-aspect-ratio wing the large transient effects predicted by linearized theory in the transonic regime may not actually exist. (Author)

AD-290 228 Div. 9, 25
(TISTP/WH) OTS price $5.60

Naval Weapons Lab., Dahlgren, Va.
MOTION OF A PAIR OF VORTICES BEHIND A CYLINDER,
by Gerwig Vibrans. 5 Nov 62, 1v. incl. illus. 12 refs. (NWL rept. no. 1794)
Unclassified report

DESCRIPTORS: *Vortices, *Drag, *Cylindrical bodies, *Underwater ballistics, *Hydrodynamics, *Fluid mechanics, Partial differential equations, Oscillation.

An unexpectedly high drag which develops when a body is accelerated in a fluid of low viscosity has been thought to be related to the vortex ring or vortex pair which seems to develop behind such a body. The ideal flow pattern of a vortex pair, while travelling in equilibrium with a cylinder, and the forces on the cylinder are calculated for a number of examples, which include the general case of unsymmetric configurations. The motion of the vortices is investigated in the case where they are slightly displaced from the equilibrium position. An increase of flow velocity induces an oscillatory movement, and an oscillating force acts on the cylinder. If a programmed acceleration leads to a new stationary flow, then the net effect of the vortices is to diminish the induced mass. Even when the vortex strength is assumed to increase, there is apparently a decrease in induced mass. (Author)

AD-290 312 Div. 9
(TISTP/JW) OTS price $5.60

Hughes Tool Co., Culver City, Calif.
HYDROSTREAK WATER SCOOP STUDY.
Final rept.,
by N. B. Hirsh and R. W. McJones. July 62, 53p. incl. illus. 8 refs. (Rept. no. HTC-62-42)
(Contract NObs-4329, Proj. SF-0130207)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Jets, Lift, Reynolds number, Cavitation, Test facilities, Drag, Fluid flow.

A new vertical free-jet hydrodynamic test facility is checked out during a series of tests of ram inlets, fully submerged bodies and discs, surface piercing struts, and low aspect ratio planing models. Test conditions include Froude number of infinity, cavitation number of zero, and Reynolds Number of 1.5 x 10 to the 6th power. Excellent agreement is found with available re-

sults from the literature wherever comparison is possible. Cambered and flat planing surfaces of several plan forms are tested from initial water contact through full wetting to deep submergence. Lift drag ratios near 10 are found in several cases. A complete water scoop configuration is established for high speed overwater vehicle application and its lift, drag, and pressure recovery fully validate the scoop performance assumptions incorporated into previous Hydrostreak performance estimates. (Author)

AD-290 339 Div. 9
(TISTP/WH) OTS price $2.60

Brown U., Providence, R. I.
ESTIMATION OF THE HEAT TRANSFER FROM THE REAR OF AN IMMERSED BODY TO THE REGION OF SEPARATED FLOW.
Interim technical rept. on Research on Aerodynamic Flow Fields,
by P. D. Richardson. Sep 62, 24p. incl. illus. table, 39 refs.
(Contract AF 33(616)5756, Proj. 7064)
(ARL 62-423) Unclassified report

DESCRIPTORS: *Turbulent flow, *Heat transfer, *Blunt bodies, *Cylindrical bodies, *Convection.

The region of separated flow on a bluff body in a transverse stream of fluid is considered. An approximate method is described to calculate the convective heat transfer. It is applied to a cylinder in a transverse air stream, and the results are compared with experimental data in the literature. The agreement is good. The method may also be applied to other body shapes. (Author)

AD-290 491 Div. 9
(TISTP/TL) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
KINETIC THEORY DESCRIPTION OF THE INITIAL EXPANSION OF A GAS CLOUD,
by George K. Bienkowski. 2 Nov 62, 44p. incl. illus. 5 refs. (Rept. no. 35G-2)
(Contract AF 19(628)500)
(AFESD TDR 62-148) Unclassified report

DESCRIPTORS: *Fluid flow, *Gases, *Clouds, *Kinetic theory, Helium, Spheres, Air, Shock waves, Numerical analysis, Diffusion, Particles, Integration, Acceleration, Density.

The initial expansion of a gas cloud into a lower density medium is analyzed from kinetic theory considerations. The problem for a helium sphere at an initial pressure ratio of eighteen expanding into air is computed for the case of initial sphere diameter of the order of an air mean free path and for times of the order of an air mean free time. The results indicate that for this physical situation, the flow profile greatly differs from the inviscid case for the whole time of interest and no asymptotic approach to the inviscid profile is indicated. The chief effect seems to be a tendency towards a diffusion of two species with an equalization of all properties. There is a propagation of an overshoot in the density moving outwards in the gas, but it is much smaller in magnitude than the shock density rise predicted by inviscid calculations and decays more quickly than in the inviscid case. (Author)

AD-290 507 Div. 9
(TISTA/SEB) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
AXISYMMETRIC TURBULENT BOUNDARY-LAYER FLOW DETERMINED WITH ONLY BODY GEOMETRY KNOWN,
by W. A. Middleton. Nov 62, 30p. incl. illus. 17 refs. (Rept. no. NOTS TP 2868)
(NAVWEPS rept. no. 7884)
Unclassified report

DESCRIPTORS: *Axially symmetric flow, Aerodynamic configurations, Turbulent boundary layer, Integral equations, Mathematical analysis, Bodies of revolution, Geometry, Gas flow, Analysis, Theory, Torpedoes, Turbulent flow.

Semi-empirical boundary-layer equations for turbulent flow are developed and applied, using an exact solution of the Neumann problem of an approximate body in axial symmetric flow to find the turbulent boundary-layer characteristics on the after portion of the body. The only quantity needed to apply this method is knowledge of the body geometry. (Author)

AD-290 519 Div. 9
(TISTA/SEB) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE DRAG OF SPHERES IN RAREFIED HYPERVELOCITY FLOW,
by Max Kinslow and J. Leith Potter. Dec 62, 46p. incl. illus. tables, 36 refs. (Rept. no. AEDC TDR 62-205)
(Contract AF 40(600)1000, Proj. 8953)
Unclassified report

DESCRIPTORS: *Spheres, *Superaerodynamics, Hypersonics, Hypersonic flow, Differential equations, Molecules, Kinetic theory, Integral equations, Theory, Mathematical analysis, Wind tunnel models, Model tests, Shock waves, Drag.

Drag of spheres was measured under hypersonic, cold-wall, support-free conditions in a nonreacting (vibration frozen) flow. Data were obtained for a nominal free-stream Mach 11 and for Reynolds numbers from 1 to 10 based on conditions immediately downstream of the bow shock and sphere diameter. These data were supplemented by measurements at a nominal Mach 10 where a conventional balance was used, and Reynolds numbers downstream of the shock as high as 10,000 were investigated in the cold-wall condition. The experimental results were analyzed both from the point of view of continuum flow with second-order viscous effects, and from the standpoint of a noncontinuum concept, taking account of first collisions between reemitted and free-stream molecules. Data from other sources were used to enlarge the present study and, in particular, to support the evaluation of K2 which represents the influences of vorticity, curvature, thick boundary layer, slip, and temperature jump. K2 was found to be negative in sign. The form of the derived equation for Cd/Cd(free molecular), where Cd is the drag coefficient, Cd/Cd free molecular appears to fit the experimental data over a considerable range of Knudsen numbers if a free constant is used in the expression for mean free path. (Author)

AD-290 520 Div. 9
(TISTA/GEC) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
FURTHER EXPERIMENTS ON IMPACT-PRESSURE PROBES IN A LOW-DENSITY, HYPERVELOCITY FLOW,
by A. B. Bailey. Nov 62, 21p. incl. illus. table, 8 refs. (Rept. no. AEDC TDR 62-208)
(Contract AF 40(600)1000, Proj. 8950)
Unclassified report

DESCRIPTORS: *Pressure gages, *Pressure, Hypersonic flow, Measurement, Aerodynamics, Superaerodynamics, Orifice, Shock waves, High temperature research, Calibration, Test equipment.

An investigation of the behavior of flat-faced, impact-pressure probes with a range of orifice-to-probe diameter ratios was made in heated A under conditions where free stream Mach. = 4 to 14, gas temperature = 2700 to 4300 K, and Reynolds number (based on outside probe diameter and conditions behind a normal shock)/in. = 30 to 430. At the lower Reynolds numbers the measured impact pressure was found to decrease with the pressure sensing orifice size. This result agrees with that found in heated N. As the Reynolds number increased this orifice effect became less significant, and at the higher Reynolds numbers no decrease in measured impact pressure was noted for the smallest orifice tested. This tends to confirm the assumption made in some experiments on impact-pressure probes in a low-density hypervelocity flow (AD-268 391) that this behavior is caused by a thermomolecular flow effect. Because this effect is a function solely of pressure at a particular temperature, the greater the pressure the smaller the effect. When Re2 times the square root of density in free stream over density in normal shock is less than 800 in A the measured impact pressure was less than the true impact pressure and decreased to a minimum value, approximately 93% of the true value. As the Reynolds number decreased still further, the viscous effects became dominant, and there was a sharp increase in the measured impact pressure. (Author)

AD-290 609 Div. 9
(TISTA/GEC) OTS price $9.60

Rosemount Aeronautical Labs., U. of Minn., Minneapolis.
WIND TUNNEL INVESTIGATION OF A SPIKE-BLUFF BODY COMBINATION FOR A MONORAIL ROCKET SLED M = 2.0 TO M = 5.0,
by Rudolf Hermann, Frederick Moynihan, and Donald Olson. Sep 62, 102p. incl. illus. tables, 5 refs. (Rept. no. RAL-RR-186)
(Contract AF 29(600)2839, Proj. 7856)
(AFOSR/DRA 62-18)
Unclassified report

DESCRIPTORS: *Spikes, *Blunt bodies, Aerodynamic configurations, Supersonics, Aerodynamic data, Lift, Drag, Pitch, Ground effect, Interference, Turbulent flow, Wind tunnel models, Model tests, Rocket propelled sleds, Separation, Aerodynamics.

Results of wind tunnel measurements of lift, drag and pitching moment on a circular cross-section monorail sled using a flow separation spike including the influence of ground interference are presented and discussed. Variables investigated were the spike length, spike diameter and location on a series of sled nose shapes. Mach number range was from 2 to 5. The sled configuration having the largest drag (spike retracted) and the lowest drag (spike extended) was that with a flat face sled nose and with the spike mounted on the sled axis. The spike length for minimum drag, in general, became longer at higher speeds. Sled lift was essentially unaffected by variation of the spike length. Diameter of the spike had little effect on the overall lift or drag. Unsteady flow phenomena (buzzing) were observed for some sled configurations at spike lengths on the order of 1 to 1.5 body diameters, but not at spike lengths for minimum drag. When buzzing occurred it could be reduced or eliminated by rounding the sled nose shoulder. Mounting the spike below the sled axis diminished the drag reduction characteristics of the spike, increased the incidence of buzzing, but decreased the sled lift. (Author)

AD-290 695 Div. 9
(TISTP/TL) OTS price $1.60

James Forrestal Research Center, Princeton U., N. J.
SOME RESULTS FOR PLANE POISEUILLE FLOW OF RAREFIED GASES,
by Y. P. Pao. Aug 62, 13p. 4 refs. (Rept. no. 619)
(Contract AF 49(638)465, Proj. 9781)
Unclassified report

DESCRIPTORS: *Superaerodynamics, *Gas flow, Kinetic theory, Continuum mechanics, Gases, Dynamics, Velocity, Pressure.

The problem considered is that of rarefied gas flow through a long two-dimensional channel, of length L and width d, connecting two large gas reservoirs at the same temperature theta, but at slightly different pressures, namely, P1 and P2. The channel walls are also kept at the same temperature theta. Under continuum conditions, the flow rate is known to obey the classical Poiseuille formula. On the other hand, when the mean free path is not very small compared to the width, it is necessary to abandon the continuum approach in favor of the kinetic theory viewpoint. (Author)

AD-290 729 Div. 9
(TISTA/GEC) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
PRELIMINARY STUDY OF HOVER PERFORMANCE OF A RAM-WING GEM,
by Gerald R. Barlow and Richard G. Huntington. Oct 62, 39p. incl. illus. table, 3 refs.
(Rept. no. 1662; Aero rept. no. 1015)
Unclassified report

DESCRIPTORS: *Flying platforms, Jets, Leading edge flaps, Flaps, Deflection, Aspect ratio, Model tests, Aerodynamics, Aerodynamic configuration, Thrust augmentor nozzles, Wings, Ground effect.

The results of hover tests of a rectangular planform ram-wing ground-effect machine, utilizing wing-tip jets and leading-edge and trailing-edge flaps are presented. Several parameters were studied to determine optimum configurations for future ram-wing designs. The effects of aspect ratio, flap chord length, flap deflection angle, and jet nozzle angle were investigated. The results are presented as plots of augmentation factor versus ground proximity parameter. The results obtained indicate that for the configurations tested, the largest aspect ratio, the smallest flap chord length, and the smallest flap deflection angle give the lowest value of ground proximity parameter for a given augmentation. The optimum jet nozzle angle is between -60 and -72 degrees. (Author)

AD-290 737 Div. 9
(TISTP/GRW) OTS price $5.60

Technical Research Group, Syosset, N. Y.
A COMPARISON OF EXPERIMENTAL DATA WITH SIMPLE THEORETICAL RESULTS FOR VENTILATED FLOW,

by Peter Thomsen. 20 Aug 62, 1v. incl. illus. tables, 7 refs. (Rept. no. TRG-156-SR-1)
(Contract Nonr-345800)
Unclassified report

DESCRIPTORS: *Aerodynamic configurations, *Curved profiles, *Cavitation, *Drag, Planing surfaces, Theory, Conformal mapping, Fluid mechanics, Experimental data.

Behind a strut piercing the free surface and moving at a sufficient high speed, a fully ventilated cavity exists as a consequence of some basic dynamic conditions. A first simple analytic approach to the cavity shape and cavity drag can be carried out by applying the results of the 2-dimensional (2D) cavity theory. In this approach, 2D cavity flows are pieced together stripwise at various depths underneath the free surface and no considerations are made of the effects of the free surface nor of the tip end of the strut. The comparison between the results of the 2D cavity theory and those of experiments as to length and drag of the ventilated cavity are studied. (Author)

AD-290 779 Div. 9, 22
(TISTP/WH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
A COMPLETE E, P, V, T, S THERMODYNAMIC DESCRIPTION OF METALS BASED ON THE P,u MIRROR-IMAGE CONCEPT,
by Julius W. Enig. 13 Aug 62, 27p. incl. illus. tables, 12 refs. (Rept. no. NOLTR 62-149)
Unclassified report

DESCRIPTORS: *Shock waves, *Impact shock, *Thermodynamics, *Metal plates, *Wave transmission, *Equations of state, *Hydrodynamics, Reflection, Pressure.

The well-known practice of using the mirror-image, in the P,u plane, of the shock Hugoniot curve about a vertical line through the shocked state P_H, u_H is shown to give a complete thermodynamic description of metals when the U(shock velocity) vs. u_H relationship and $\alpha \equiv V^{-1}(\partial V/\partial T)_{P \gtrsim 0}$ are known. Use of the experimental relationship $U = c_o + au_H$ (a and c_o constants) and α = constant, leads to a thermodynamic description which results in the metal appearing less compressible than if described by the Mie-Gruneisen equation of state. Furthermore, the existence of an anomalous behavior of c_p in the low pressure neighborhood of the initial state rules out the simultaneous existence of a Hugoniot satisfying the linear U vs. u_H relationship, of isentropes satisfying the mirror-image assumption, and of a constant value of α in this neighborhood. Thermodynamic functions for 16 metals are calculated up to 2 megabars and compared with the results obtained from the Mie-Gruneisen equation of state. (Author)

AD-290 786 Div. 9, 25
(TISTP/JW) OTS price $4.60

AVCO Everett Research Lab., Mass.
THE MAGNETOHYDRODYNAMICALLY SUPPORTED HYPERSONIC SHOCK LAYER,
by R. H. Levy and H. E. Petschek. Sep 62, 43p. incl. illus. 16 refs. (Research rept. no. 140)
(Contract AF 04(694)33)
(BSD TDR 62-337)
Unclassified report

DESCRIPTORS: *Hypersonic flow, *Boundary layer, Magnetohydrodynamics, Shock resistance, Magnetic fields, Conductivity, Wire, Heat transfer, Cylindrical bodies.

The two-dimensional problem of the interaction of a hypersonic flow with the field of a current carrying wire is analyzed. The electrical conductivity behind the normal shock is taken to have an arbitrary finite value, while the free stream conductivity is zero. It is found that the magnetohydrodynamically supported shock wave follows the magnetic field lines closely and that the hot flow is confined to a narrow region behind the shock at all values of conductivity. For low conductivities the case of a wire embedded in a solid cylinder has also been considered, and it is shown that the heat transfer is reduced sharply when the shock wave is lifted off of the surface of the cylinder. (Author)

AD-290 831 Div. 9
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LONGITUDINAL FLOW AROUND A HEATED CYLINDER OF A HIGHLY VISCOUS LIQUID,
by A. Sh. Asaturyan and B. A. Tonkoshkurov. 23 Oct 62, 8p. incl. table, 4 refs. (Trans. no. FTD-TT-62-1333 from Inzhenerno-Fizicheskiy Zhurnal 3, 7:pp. 106-111, 1960)
Unclassified report

DESCRIPTORS: *Fluid flow, *Cylindrical bodies, Heat transfer.

AD-290 832 Div. 9
(TISTA/SEB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELEMENTS OF THE THEORY AND METHOD OF DETERMINING THE DYNAMIC UNBALANCE OF ROTORS,
by V. Ye. Myachin. 22 Oct 62, 12p. incl. illus. (Trans. no. FTD-TT-62-1332 from Izvestiya Vysshikh Uchebnykh Zavedeniy. Mashinostroyeniye 2:pp. 5-13, 1962)
Unclassified report

DESCRIPTORS: *Rotors, Theory, Motion, Mathematical analysis, Vibration, Oscillation, Test methods, Autogyro rotors, Gas turbine rotors, Determination.

The theory and method of facilitating and speeding up the process of finding the point of rotor unbalance was studied. At the present time the point of unbalance is determined with the aid of complex tracking systems (photocell-optics-oscillograph; generator, synchronously rotating with rotor; stroboscope etc.). The rotating movement of the rotor is replaced with angular oscillatory movement, with oscillation amplitude of the order of several degrees. (Author)

AD-290 942 Div. 9
(TISTA/GEC) OTS price $4.60

Princeton U., N. J.
THE FLOW ABOUT THE LEADING EDGE OF A SWEPT BLUNT PLATE AT HYPERSONIC SPEEDS.
Interim rept. on Aerothermodynamic Investigations in High Speed Flow,
by C. C. Horstman and I. E. Vas. Aug 62, 36p. incl. illus. tables, 18 refs.
(Contract AF 33(616)7629, Proj. 7064)
(ARL 62-405) Unclassified report

DESCRIPTORS: *Swept-back wings, *Wings, Hypersonics, Load distribution, Pressure, Aerodynamics, Heat transfer, Metal plates, Thermodynamics, Aerodynamic configurations, Wind tunnel models, Model tests, Blunt bodies.

As part of a fundamental study of hypersonic wings, some detailed pressure distribution and heat transfer results were obtained over sections of the leading edge region of a blunt plate at sweep angles from zero to 75 degrees. The tests were carried out in a Helium hypersonic wind tunnel at Mach numbers from 7 to 17. Some effects of the apex or upstream boundary of the plate on the leading edge regions under study were determined at various stations along the leading edge. The leading edge regions examined showed deviations from normal Mach number considerations at high sweep angles over the entire Mach number range studied. (Author)

AD-291 030 Div. 9, 4
(TISTM/TCG) OTS price $5.60

AeroChem Research Labs., Inc., Princeton, N. J.
INFLUENCE OF THE TURBULENT DIFFUSION BOUNDARY LAYER ON THE APPARENT KINETICS OF SURFACE REACTIONS IN EXTERNAL FLOW SYSTEMS,
by Daniel E. Rosner. July 62, 51p. incl. illus. tables, 25 refs. (Rept. no. TP-50)
(Contract AF 49(638)1138)
Unclassified report

DESCRIPTORS: *Turbulent boundary layer, *Diffusion, *Surfaces, *Solids, Chemical reactions, Reaction kinetics, Energy, Mathematical analysis, Laminar boundary layer, Catalysts.

The occurrence of diffusion boundary layers in the vicinity of solid catalysts in forced-flow systems causes the apparent chemical kinetics of surface reactions to differ from the true interfacial kinetics. The magnitude of this falsification is investigated quantitatively for the case of turbulent incompressible flow within the boundary layer, using the uniform catalytic flat plate as an example. Corresponding results for laminar diffusion layers are included for comparison. Several distinct computational techniques are discussed for diffusional Prandtl numbers of order unity as well as for the asymptotic extreme. Tabular values are given of all pertinent nondimensional reaction rate coefficients over the entire range from reaction rate-to-diffusion control for one-half, first and second order irreversible surface reactions using a rational improvement of the Frank-Kamenetskii quasi-stationary approximation. (Author)

AD-291 031 Div. 9
(TISTA/GEC) OTS price $2.60

AeroChem Research Labs., Inc., Princeton, N. J.
FUNDAMENTAL SOLUTION TO THE DIFFUSION BOUNDARY LAYER EQUATION FOR NEARLY SEPARATED FLOW OVER SOLID SURFACES AT VERY LARGE PRANDTL NUMBERS,
by Daniel E. Rosner. Nov 62, 24p. incl. illus. tables, 19 refs. (Rept. no. TP-52)
(Contract AF 49(638)1138)
Unclassified report

DESCRIPTORS: *Boundary layer, Mathematical analysis, Convection, Separation, Wedges, Integral equations, Laminar boundary layer, Turbulent boundary layer, Aerodynamics, Diffusion.

Using the method of self-similar solutions, an exact fundamental solution to the equation of convective diffusion is obtained for the case of nearly separated flow over a surface when the Prandtl number is very large compared to unity. The driving force for diffusion is assumed to change abruptly from zero to unity at the streamwise location x = xi and an arbitrary distribution of the velocity profile curvature parameter (delta sq. u/delta y sq.)y = 0 is allowed through the use of the Von Mises transformation. An integral (profile) method using a cubic polynomial for the dimensionless concentration (temperature) profile is shown to predict the correct functional form of transfer coefficient but overestimates its magnitude by 3.3%. This is more than twice the error of a corresponding integral method solution to the nonseparating flow problem, suggesting once again that for a given number of terms in the approximating polynomial the accuracy of profile methods in general deteriorates as one nears separation of the velocity boundary layer. (Author)

AD-291 032 Div. 9
(TISTA/GEC) OTS price $1.60

AeroChem Research Labs., Princeton, N. J.
SCALE EFFECTS FOR NONEQUILIBRIUM CONVECTIVE HEAT TRANSFER WITH SIMULTANEOUS GAS PHASE AND SURFACE CHEMICAL REACTIONS: APPLICATION TO HYPERSONIC FLIGHT AT HIGH ALTITUDES,
by Daniel E. Rosner. Nov 62, 19p. incl. illus. 35 refs. (Rept. no. TP-54)
(Contract AF 49(638)1138)
Unclassified report

DESCRIPTORS: *Heat transfer, Chemical reactions, Gases, Surface properties, Hypersonics, Energy, Enthalpy, Recombination reactions, Re-entry vehicles, Convection, Mathematical analysis, Thermodynamics, Laminar boundary layer, Convection, Thermal radiation, Re-entry aerodynamics.

Conceptual division of the general problem of nonequilibrium convective heat transfer into a transfer coefficient and generalized recovery enthalpy driving force fails to confine the dominant influence of fluid dynamic quantities to the coefficients themselves. The Reynold's number dependence of the energy transport rate can exhibit unusual behavior, particularly in the mixed regime in which strongly exothermic gas phase and surface atom recombination reactions are of comparable importance. A class of manned re-entry bodies will experience peak heating rates in altitude-speed regions where nonequilibrium atom recombination will be the rule. Available calculations indicate that the peak heat flux could differ by a factor of three. A controllable trajectory which has been optimized on the basis of a convective heating rate may be significantly different from the true optimal trajectory taking due account of nonequilibrium phenomena. It has been conjectured that if nonequilibrium recombination were included in certain design calculations there might exist optimum nose radii for minimum heat flux somewhat in analogy to the more familiar case of combined convective and radiative heat transfer. (Author)

AD-291 075 Div. 9, 25
(TISTP/WH) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
EXPANSION OF GAS CLOUDS AND HYPERSONIC JETS BOUNDED BY A VACUUM,
by H. Mirels and J. F. Mullen. Sep 62, 27p. incl. illus. tables, 6 refs. (Rept. no. TDR-169 (3230-12)TR-1)
(Contract AF 04(695)169)
(SSD TDR 62-96) Unclassified report

DESCRIPTORS: *Gas flow, *Vacuum systems, *Hypersonic flow, *Space environmental conditions, Jets.

The unsteady expansion of gas clouds, bounded by a vacuum, is considered for both continuum and free molecular flows. Known analytical solutions are reviewed with emphasis on the asymptotic nature of the flow after long times. An approximate analytical solution is presented for the continuum expansion of an initially uniform gas cloud. For a plane expansion, the approximate solution is in exact agreement with the known exact solution. For cylindrical and spherical expansions, the approximate solution gives results for density (at the axis) which are about 10% higher than those obtained by a numerical integration of the equations of motion. The continuum and free molecular expansions of an initially uniform gas are found to be quite similar after a while except for the flow in the vicinity of the leading edge of the expansion. For a given gas, the density at the axis decays more rapidly, with time, for the continuum case. The extension of these results to hypersonic jets bounded by a vacuum, is also noted. (Author)

AD-291 099 Div. 9, 25
(TISTP/JW) OTS price $1.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
MULTISLAB CONCEPT APPLIED TO RADIO-WAVE PROPAGATION IN THE IONOSPHERE AND ITS LIMIT TO THE CONTINUOUS IONOSPHERE,
by A. J. Ferraro. 1 Jan 63, 16p. incl. illus. 8 refs. (Scientific rept. no. 176)
(Contract AF 19(604)8012, Proj. 8605)
(AFCRL 62-1079) Unclassified report

DESCRIPTORS: *Wave characteristics, *Ionospheric propagation, Radio waves, Magnetic effects, Polarization, Differential equations.

The multislab approach to radio wave propagation at vertical incidence in the ionosphere is described and the limiting case of an infinity of slabs, i.e. the transition to the continuous ionosphere including magneto-ionic coupling is considered. It is shown that the multislab solution does coverge. In the process of demonstrating convergence, four first-order coupled equations are generated. A discussion of limiting polarization with the use of the first-order equations is given and the results compared with those obtained from the Rydbeck second-order coupled propagation equations. (Author)

AD-291 168 Div. 9
(TISTA/GEC) OTS price $1.60

RAND Corp., Santa Monica, Calif.
TURBULENT FRICTION ON A FLAT PLATE IN THE SUPERSONIC FLOW OF A GAS,
tr. by Joy B. Gazley. Nov 62, 14p. incl. illus. tables, 20 refs. (Memo. no. RM-2968-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Metal plates, Friction, Turbulent flow, Aerodynamics, Turbolent boundary layer, Mathematical analysis, USSR, Supersonics, Supersonic flow.

AD-291 178 Div. 9
(TISTA/GEC) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
DRAG OF OBJECTS IN PARTICLE-LADEN AIR FLOW PHASE IV. BLUNT BODIES AND COMPRESSIBILITY EFFECTS.
Final report,
by R. E. Lundberg. Nov 62, 59p. incl. illus. tables, 12 refs.
(Contract DA 49-146-XZ-024)
Unclassified report

DESCRIPTORS: *Blunt bodies, Compressible flow, Theory, Particles, Nuclear explosions, Dust explosions, Cylindrical bodies, Spheres, Shock waves, Gas flow, Aerodynamics, Mathematical analysis, Air blast, Pressure, Particle trajectories, Drag.

The drag forces in dusty air flow due to a nuclear explosion reported for cylinders and spheres are compared with drag effects on rectangular blunt bodies which are characteristic of target shapes of military interest. The results are best correlated by an inertia parameter and particle Reynolds number or a combination of these two called the reduced inertia parameter. The comparison reveals that for values of the reduced inertia parameter greater than unity the blunt body experiences about twice the particle drag of a sphere and about one and one-half times the particle drag of a cylinder of the same projected area, and for the reduced inertia parameter decreasing from unity the particle drag experienced by the blunt body decreases less rapidly than that experienced by the cylinder or the sphere and remains appreciable even at the reduced inertia parameter of 0.1. (Author)

AD-291 199 Div. 9, 31
(TISTE/OHD) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
BODIES OF REVOLUTION WITH HIGH CAVITATION-INCEPTION SPEEDS - FOR APPLICATION TO THE DESIGN OF HYDROFOIL-BOAT NACELLES,
by Wilburn L. Moore. Sep 62, 22p. incl. illus. tables, 17 refs. (Rept. no. 1669)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Bodies of revolution, *Cavitation, Analysis, Design.

The potential velocity distributions of some promising bodies of revolution from the aeronautical and hydrodynamic literature are compared as part of a project to present design data for hydrofoil-boat nacelles. The potential velocity distributions, cavitation-inception speeds, based on pressure only, are predicted for each shape. One model is judged most promising for hydrofoil-boat application. (Author)

10. FUELS AND COMBUSTION

AD-290 329 Div. 10
(TISTM/TCG) OTS price $4.60

Thiokol Chemical Corp., Elkton, Md.
A RESEARCH STUDY TO ADVANCE THE STATE-OF-THE-ART OF SOLID PROPELLANT GRAIN DESIGN.
Quarterly progress rept. no. 9, 1 July-1 Oct 62,
by H. G. Jones. 1 Dec 62, 42p. incl. illus. 16 refs. (Rept. no. E173-62)
(Contract AF 33(616)6530, Proj. 3059)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, Surfaces, Combustion, Flame propagation, Interior ballistics, Statistical analysis, Analog computers, Equations, Programming, Viscosity, Elasticity,

Creep, Relaxation time, Stresses, Physical properties, Design, Configuration, Heat transfer.

This program is a research study to advance the state-of-the-art of solid propellant grain design and consists primarily of theoretical and applied analyses of solid propellant grain designs, considering in particular heat transfer effects, propellant slump, and the effect of strain on burning rate. An analytical study is being undertaken to develop a two-dimensional heat transfer analysis for solid propellant motors subjected to a nonlinear external thermal environment. The application of this analysis to the Advanced Grain Design Computer Program, previously developed under this contract, is also being investigated to determine thermal effects upon ballistic characteristics. Finite-difference equations representing an irregular convective and radiative boundary condition and a case-propellant interface situation were developed. Experimental procedures for the determination of the effect of strain on burning rate have been developed. A review of current and past literature in the area of ''slump'' was performed, and an analysis for determining the linear viscoelastic operator parameter was developed. (Author)

AD-290 723 Div. 10, 14
(TISTM/EJH) OTS price $.75

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DEVELOPMENT AND EVALUATION OF GUM PREVENTIVE, GASOLINE,
by Jules B. Counts. 29 Aug 62, 26p. incl. illus. tables, 10 refs. (Rept. no. CCL-130)
(Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Gasoline, *Fuel additives, *Antioxidants, Fuels, Storage, Stability, Copper, Contamination, Phenyl radicals, Butyl radicals, Amines, Propanes, Salicylic acids.

The object of this investigation is to develop an improved gum preventive compound with emphasis on ability to stabilize gasoline in small power units during short storage periods, and in vehicle fuel tanks during standby storage. Optimum amounts of gum preventive compound and ratio of antioxidant to metal deactivator were determined. The resultant improved formulation was added to combat gasoline and regular motor fuel to determine it stabilizing ability. The stability of the improved formulation in various types of containers was also determined. The improved gum preventive compound stabilized the various uncontaminated and copper contaminated gasolines at high undiminished levels up to five months. Comparison of the inhibiting ability of a freshly made gum preventive compound and one stored for four months at an elevated temperature showed that the inhibiting ability of the stored compound remained unchanged and that it effectively stabilized the fuel. (Author)

AD-291 187 Div. 10, 25
(TISTM/ODM) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
GRAVITATIONAL STRESSES IN A CYLINDRICAL, ORTHOTROPIC, VISCO-ELASTIC SOLID PROPELLANT GRAIN,
by Jerome M. Klosner and Mahmoud Sadre. Oct 62, 31p. incl. illus. 10 refs. (PIBAL rept. no. 660)
(Contract Nonr-83932, Proj. NR 064-457)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, Mathematical analysis, Theory, Integral transforms, Gravity, Elasticity, Special functions, Cylindrical bodies, Stresses.

The quasi-static analysis of a long, circular, orthotropic, visco-elastic, cylindrical solid propellant grain supported rigidly at its outer surface and subjected to gravitational stresses acting perpendicular to its longitudinal axis is presented. The solution is obtained by use of a generalized Laplace transform and the inversion integral is evaluated for short and very long times. An exponential form is then used to obtain results for the complete time range. A comparison is made between the orthotropic viscoelastic, orthotropic elastic, and the isotropic elastic solutions of the same problem for three shell thicknesses. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-289 677 Div. 11
(TISTE/CAM) OTS price $3.60

Army Transportation Board, Fort Eustis, Va.
TRANSPORTER, FOUR TRACKED, 8-AXLE 24,000-POUND (NODWELL RN200) PHASE II: SUBARCTIC EVALUATION. Final rept. for Phase II.
Nov 62, 35p. incl. illus. 3 refs. (Rept. no. TCB-61-136-EV)
Unclassified report

DESCRIPTORS: *Tracked vehicles, *Cargo vehicles, Terrain, Climatic factors, Arctic regions, Stability, Operation, Maneuverability, Maintenance, Test methods.

The Nodwell RN200 Transporters (designated TCB-43 and TCB-44) were evaluated in conjunction with 16 other vehicles in Alaska in Exercise Great Bear, and during controlled operations at the Ordnance Arctic Test Facility, Fort Wainwright. During the exercise, the vehicles carried miscellaneous loads up to 21,600 pounds per vehicle over the frozen and snow-covered trails and routes of the maneuver area for a total of 471 miles and about 110 operating hours. Availability of the vehicles during this phase was 94%. During controlled operations at Fort Wainwright, the TCB-44 vehicle carried 24,500 pounds payload across snow-covered terrain, having snow depths up to 5 feet, negotiated 65% forward slopes and 30% side slopes covered with 2 to 3 feet of soft snow. The vehicle also broke trails through forested areas having trees up to 8 inches in diameter. During both parts of the evaluation, the two vehicles travelled a total of 687 miles, having an availability in excess of 92%, with no major vehicle failures occurring, and at no time were they immobilized due to the terrain. (Author)

AD-289 686 Div. 11, 13, 33
(TISTE/OHD) OTS price $4.60

Army Transportation Board, Fort Eustis, Va.
CRANE, ROUGH TERRAIN, 20 TON.
Final rept.
Nov 62, 41p. incl. illus. tables, 5 refs.
(Rept. no. TCB-60-021-OE)
Unclassified report

DESCRIPTORS: *Earth moving equipment, *Hoists, *Recovery vehicles, *Booms, Terrain, Vehicles, Graders, Operation, Feasibility studies, Handling, Machines, Road building equipment, Maintenance, Tests, Sand, Amphibious operations.

Evaluation was made of the Crane, Rough Terrain, 20-ton. The crane demonstrated improved performance over existing 10-ton crawler and 20-ton truck mounted cranes during dump and beach cargo-moving operations and over the 25-ton Navy crash recovery crane for rough terrain aircraft recovery operations. It was recommended that the item be authorized appropriate Transportation Corps units in lieu of currently authorized 10-ton truck mounted cranes. (Author)

AD-289 880 Div. 11
(TISTE/OHD) OTS price $3.60

Army Transportation Board, Fort Eustis, Va.
CARRIER, 1 TON, TRACKED (TRACKMASTER, MODEL 4T2) PHASE II: SUBARCTIC EVALUATION.
Final evaluation rept.
Nov 62, 29p. incl. illus. (Rept. no. TCB-61-160-EV)
Unclassified report

DESCRIPTORS: *Tracked vehicles, *Arctic regions, *Snow vehicles, Cargo vehicles, Tests, Alaska, Passenger vehicles, Temperature, Cargo, Operation, Maintenance, Armed forces maneuvers, Permafrost, Terrain.

Two vehicles were driven a total of 1,416 mi in a total of 291.8 engine operating hours. One vehicle traversed 635 and the other 781 mi. The vehicles negotiated 55% slopes covered with snow up to 36 inches deep while carrying a 3/4 ton load. The vehicles ascended a 50% slope with no load and while carrying a 1-ton load, attained maximum speeds of 40 mph on a cross-country course covered with light snow. During the exercise, the vehicles performed without difficulty in ambient temperatures ranging from +25 to -42 F. Turning movements were executed successfully on a 40% slope with the vehicles unloaded and while carrying a 3/4 ton load. Vehicles also operated on 50% side slopes. A maximum speed of 47 mph on flat hard packed snow in the unloaded condition was attained. Vertical obstacles two ft high, snow banks, ditches and draws were traversed without difficulty. During cross-country operation, fuel consumption averaged 5 mi per gallon unloaded and 4.4 mi per gallon with the vehicle carrying a 3/4 ton load. Deceleration stops from 35 mph on hardpacked snow carrying a 1-ton load were accomplished in 31 to 36 feet. While unloaded the stopping distance was 41 to 43 ft. The turning radius was 18 ft to the right and 16 ft 4 in to the left; radius of turns was measured on the outside. (Author)

AD-290 267 Div. 11, 33
(TISTB/MD) OTS price $1.60

United States Army, Alaska.
THE CAPABILITY OF A LIGHTWEIGHT, HELICOPTER-TRANSPORTABLE BULLDOZER TO PREPARE A HASTY LANDING STRIP FOR STOL TYPE AIRCRAFT IN UNDEVELOPED AREAS.
Report on Combat Developments.
Oct 62, 11p. incl. illus. 4 refs. (Concept Evaluation rept. Nr. ARACD 1600-62 CE 31-62)
Unclassified report

DESCRIPTORS: *Bulldozers, *Runways, *Air transportation, Helicopters, Effectiveness, Tests, Construction.

12. GUIDED MISSILES

AD-289 612 Div. 12
(TISTW/RD) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A SATELLITE LOOK ANGLE CALCULATOR,
by Rodney C. Pratt. Oct 62, 13p. incl. illus.
(Rept. no. RADC TDR 62-391)
(Proj. 4519)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Satellite vehicle trajectories, *Orbital flight paths, Azimuth, Tracking, Measurement.

The satellite look angle calculator is designed to be an aid to satellite tracking and a tool for engineers working with satellite configurations. To use the calculator, the position of a satellite must be known for some particular time, and from this information the following can be obtained: (1) look angles for the satellite (azimuth and elevation) from a particular tracking station; (2) the satellite position above the earth for any time; (3) satellite period and velocity; (4) orbit traces from one revolution to the next; (5) doppler shift information; and (6) slant range from tracking station to satellite. (Author)

AD-289 684 Div. 12
(TISTA/SEB) OTS price $1.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
EQUATORIAL ORBITS OF A SATELLITE IN THE GRAVITATIONAL FIELD OF A SPHEROID.
Final rept.,
by G. B. Findley and P. M. Fitzpatrick. Nov 62, 17p. 6 refs. (Rept. no. APGC-TDR-62-65)
Unclassified report

DESCRIPTORS: *Orbital flight paths, Satellite vehicles, Equations, Motion, Gravity, Differential equations, Spheres, Theory, Mathematical analysis, Earth.

A precise expression was obtained for the equatorial orbits of a small satellite moving in the gravitational field of a spheroid which possesses equatorial and rotational mass symmetry. For earth satellite orbits, the results can be applied over the entire range of values of the eccentricity e of the unperturbed elliptic motion. The radial distance from the spheroid's center to the satellite is expressed as a periodic function in the true anomaly, complete to the seventh order in a small dimensionless parameter epsilon. For bound geoidal orbits, the parameter epsilon is less than 0.033 for all values of e. The potential used to represent the spheroid includes the sixth harmonic. The solution contains three adjustable constants which permit the coefficients of the second, fourth, and sixth harmonics in the potential to be fitted to observational data. (Author)

AD-289 685 Div. 12
(TISTA/SEB) OTS price $1.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
CRITERIA FOR SCHROEDINGER SEPARABILITY APPLIED TO SATELLITE ORBIT THEORY.
Report on Proj. SPACE TRACK,
by P. M. Fitzpatrick and G. B. Findley. Nov 62, 13p. 8 refs. (Rept. no. APGC TDR 62-67)
Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Orbital flight paths, Energy, Mathematical analysis, Theory, Mechanics, Quantum mechanics, Position finding, Satellite vehicles, Equations, Motion.

Certain criteria for separating the Schroedinger wave equation of quantum mechanics will also permit separation of the Hamilton-Jacobi equation of classical mechanics. In particular, a potential which leads to separability under these criteria must have the same functional form for either equation. The most general axially symmetric gravitational potential which permits Hamilton-Jacobi separability in spherical coordinates is found to be the sum of the zeroth and first spherical harmonics. This result is discussed in relation to several other gravitational potentials which have been used in artificial satellite orbit studies. (Author)

AD-289 835 Div. 12, 28
(TISTB/LMH) OTS price $2.60

Naval Missile Center, Point Mugu, Calif.
SOME HUMAN-FACTORS CONSIDERATIONS IN THE ELECTRO-OPTICAL GUIDANCE CONCEPT,
by J. L. Fozard. 22 Nov 62, 20p. 16 refs. (Technical memo. no. NMC-TM-62-59)
Unclassified report

DESCRIPTORS: *Guided missiles, *Human engineering, *Guided missile personnel, Terrain, Detection, Visibility, Tracking, Display systems, Guidance, Control systems, Visual perception.

Some human-factors considerations are discussed relevant to the development of an electro-optical missile-guidance system in which the missile's view of the terrain is presented to a remote operator. Such a system would employ a television sensor built into the missile, a transmission link to the airborne missile-control aircraft, a television display with appropriate controls and a transmission link from the plane to control the launching and guidance of the missile. While the operational concept is not established, typical targets are those of a close-support air operation involving such objects as tanks, bridges, tunnels, etc. (Author)

AD-289 866 Div. 12
(TISTP/TL) OTS price $1.60

Philco Corp., Palo Alto, Calif.
AN ACCURACY STUDY OF THE INITIAL CONDITIONS GENERATOR USING VERLORT DATA.
Technical documentary rept.,
by M. Grossberg. 20 Sep 62, 10p. incl. illus. tables (Rept. no. WDL-TR1906)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Numerical analysis, *Mathematical prediction, *Statistical analysis, *Satellite vehicles, *Orbital flight paths, *Simulation, Errors, Satellite vehicle antennas.

The propagation errors of the initial condition generator are studied in two ways: (1) by comparing observational data on one pass with predictions from initial conditions generated on a previous pass of the same satellite, and (2) by statistically comparing the elements generated by different passes of the satellite. These two methods are found to agree. Excluding one set of poor data, it is found that the propagation error has a position standard deviation of about ten nautical miles perpendicular to the orbit plane, and of about fifty nautical miles in this

plane. The period error is found to have a standard deviation of about seventy-five to one hundred seconds. A means of reacquiring the satellite on the basis of this analysis is presented and linearized equations for the antenna program are listed. (Author)

AD-289 875 Div. 12, 5
(TISTW/RD) OTS price $2.60

Philco Corp., Palo Alto, Calif.
A TELEMETRY IMPROVEMENT STUDY.
Technical documentary rept.
1 Oct 62, 1v. incl. illus. tables, ref. (Rept. no. WDL-TR1909)
(Contract AF 04(695)112)
Unclassified report

DESCRIPTORS: *Delay lines, *Radiofrequency filters, *Intermediate frequency filters, *Telemetering data, *Satellite vehicles, Digital systems, Pulse modulation, Coding, Mathematical analysis,

An abbreviated derivation is given for a tapped delay-line Wiener filter. An attempt is made to apply filtering of this type to a PCM-PM-PM telemetry signal. Both i-f filtering and post-detection filtering are considered. It is proposed that measurements be made of received signal and noise, and from these a determination be made of optimum filter coefficients. Results show that such filtering is of marginal value for the particular telemetry signal investigated. (Author)

AD-290 079 Div. 12, 27
(TISTA/SEB) OTS price $2.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO OCTOBER 2-4, 1962. THERMIONIC-NUCLEAR SPACE POWER SYSTEMS,
by Herman Miller. 1962, 9p. incl. illus.
Unclassified report

DESCRIPTORS: *Electric propulsion, *Nuclear propulsion, Nuclear power plants, Thermionic emission, Electrons, Theory, Cesium, Vaporization, Diodes, Symposia, Space flight.

The theory and practical effects of energy conversion for electric propulsion using thermionic emission are reported.

AD-290 080 Div. 12, 27
(TISTA/SEB) OTS price $1.60

National Aeronautics and Space Administration, Washington, D. C.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO OCTOBER 2-4, 1962. NASA RESEARCH ON RESISTANCE HEATED HYDROGEN JETS,
by John R. Jack. 1962, 8p. incl. illus. 1 table, 5 refs.
Unclassified report

DESCRIPTORS: *Electric propulsion, Gases, Hydrogen, Heating, Exhaust nozzles, Heat exchangers, Thrust, Specific impulse, Jets, Space flight, Symposia.

The electric propulsion scheme to be considered is the simple hydrogen heated jet. In this approach, hydrogen is heated by passing it through or over an electrically heated refractory metal heat exchanger prior to expansion in a nozzle. To be useful for space missions, such an engine must be capable of producing a vacuum specific impulse of the order of 1000 seconds. Fortunately with a suitable design, the required heat exchanger temperatures can be obtained. In addition to being competitive in terms of specific impulse, this propulsion approach offers other potentially attractive features some of which are high efficiency, long life and reliability, simple matching to power supply, simple starting technique, and variable thrust. (Author)

AD-290 081 Div. 12, 27
(TISTA/SEB) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO OCTOBER 2-4, 1962. STL HEAVY PARTICLE PROPULSION PROGRAM,
by Ernest Cohen. 1962, 6p. incl. illus. 5 refs.
Unclassified report

DESCRIPTORS: *Colloids, *Electric propulsion, Electrostatics, Metals, Liquids, Drops, Glycerols, Antimony compounds, Chlorides, Heavy elements, Liquid metals, Electric fields, Propulsion, Symposia.

The colloidal charged droplet program has been concerned with forming droplets of metallic and non-metallic liquids from the bulk liquid in a single step. These droplets have radii of ten microns and less. Droplets, produced by passage of the liquid through a capillary metal tube held at a high potential, obtain charge/mass ratios of possible interest for electrostatic propulsion applications. (Author)

AD-290 082 Div. 12, 27
(TISTA/SEB) OTS price $2.60

AVCO Everett Research Lab., Mass.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO OCTOBER 2-4, 1962. PLASMA FLOW IN A MAGNETIC ARC NOZZLE,
by R. M. Patrick and W. E. Powers. 1962, 12p. incl. illus. 4 refs.
(Contract AF 49(638)659)
Unclassified report

DESCRIPTORS: *Electric propulsion, *Plasma physics, Exhaust nozzles, Argon, Magnetohydrodynamics, Velocity, Gas flow, Physical properties, Pressure, Accelerators, Effectiveness, Symposia, Magnetic fields.

The performance characteristics of a magnetic annular arc were investigated. This configuration consists of two coaxial electrodes separated by an annular passage through which the plasma flows with a steady solenoidal magnetic field throughout the flow region. Initial tests at small magnetic Reynolds number in a constant area configuration demonstrated that the impedance of the magnetic annular arc can be increased by a factor of 25 with the application of an axial magnetic field between the coaxial electrodes. This increased impedance was shown to be due to Hall currents that flow around the annulus between the electrodes. In addition to plasma heating, the interaction between the plasma currents and the magnetic field has produced directed energy comparable to the thermal energy.

To exhibit thrust, a 10 degree half angle nozzle was added and surveys of the plasma properties taken at the nozzle exit are presented. A 50 degree half angle nozzle configuration has also been studied in which most of the plasma currents flow in the expanding flow region. An effort has been made to produce directed axial energy through the interaction of the circulating Hall currents and the radial component of the magnetic field. (Author)

AD-290 099 Div. 12, 27
(TISTA/GEC) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
QUARTERLY BIBLIOGRAPHY OF REPORTS, 1 JULY-30 SEPTEMBER 1962,
comp. by Barbara H. Peer. 15 Oct 62, 11p.
(Rept. no. CSR-169(9990)QBR-1)
(Contract AF 04(695)169)
Unclassified report

DESCRIPTORS: *Bibliography, *Spaceships, Booster rockets, Re-entry vehicles, Satellite vehicles, Detectors, Control systems, Ground support equipment, Plasma physics, Electric propulsion, Aerodynamics.

AD-290 223 Div. 12
(TISTB/MS) OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
U. S. NAVY SUPPORT OF PROJECT MERCURY.
17 Aug 62, 14p. incl. illus. (Technical memo. no. NMC TM 62-21)
Unclassified report

DESCRIPTORS: *Space flight, *Naval personnel, Space capsules, Training, Navy, Space medicine.

Contents:
The Mercury program
The Navy's role
Development
  The pressure suit
  The landing system
Training
  Centrifuge
  Test chamber
Monitoring
Recovery

AD-290 236 Div. 12
(TISTA/GEC) OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE INFLUENCE OF CONSTANT DISTURBING TORQUES ON THE MOTION OF GRAVITY-GRADIENT STABILIZED SATELLITES,
by T. B. Garber. Nov 62, 8p. incl. illus. 5 refs. (Rept. no. P-2672)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Torque Motion, Gravity, Stabilization systems, Mathematical analysis, Equations, Motion, Stability.

The effect of a constant disturbing torque upon the transient response of a gravity-gradient stabilized body is demonstrated. It is assumed that the satellite is on a circular orbit. Thus the oblateness and other asymmetries of the earth are neglected. The only torques which act on the body are those due to the gravity gradient, and the contant disturbance. (Author)

AD-290 483 Div. 12
(TISTW/RD) OTS price $1.60

Lockheed Electronics Co., Plainfield, N. J.
RADAR SAFETY SYSTEM ARMAMENT TRAINING AND TESTING.
Final report on Positive Target Identification Devices,
by W. L. McCulloh. Nov 62, 13p. incl. illus.
(Contract AF 08(635)2096, Proj. 7826)
(ASD TDR 62-116) Unclassified report

DESCRIPTORS: *Training, *Guided missiles (Air to air), *Safety devices, *Radar echo areas, *Aerial targets, Towing planes, Towed planes, Tests, Safety, Pilots, Training devices, Radar equipment, Identification.

Armament training of interceptor pilots and the testing of air-to-air missiles often require the use of radar augmented towed targets such as the TDU-9/B. The interceptor aircraft approaching the mother plane-tow target combination acquires and locks-on to a target by radar. Since it is not always possible for the interceptor pilot to differentiate between the tow target and the towing aircraft, a hazardous condition may exist, due to angle of attack, closure rate, or visibility. To maintain a high degree of range safety, it would be most desirable that a definite, unmistakable indication of interceptor radar acquisition and lock-on to the tow target exists; and, that the interceptor missiles are fail-safe disarmed until such indication is obtained and maintained. The augmented radar return is amplitude modulated at 10 cycles per second in the tow-target and detected in the interception aircraft to obtain an unmistakable indication of target acquisition. (Author)

AD-290 559 Div. 12, 26
(TISTM/BRW) OTS price $2.60

Ingersoll Kalamazoo Div., Borg-Warner Corp., Mich.
THE EFFECT OF SURFACE DECARBURIZATION ON PROTOTYPE MISSILE CASES.
Quarterly rept. no. 2, 1 July-30 Sep 62,
by E. S. Mills and D. P. Thomason. 15 Nov 62, 24p. incl. illus. tables.
(Contract Nord-15719)
Unclassified report

DESCRIPTORS: *Rocket cases, *Steel, Welded joints, Bonded joints, Lathes, Manufacturing methods, Heat treatment, Hydrostatic pressure, Tests, Surface properties, Materials, Processing.

Progress is reported on the fabrication and hydrotesting of each of three types of decarburized prototype cases, namely: MBMC #1 and Super Tricent steel welded cases, Super Tricent seamless cases, and Super Tricent seamless cases with bonded end rings. Test results of MBMC #1 welded seam cases tabulated and graphically illustrated are shown to correlate with the laboratory specimen data gathered during the 1961 decarburization study. Also, test results of bonded uniaxial and biaxial stress specimens are given which indicate that the target bonded joint strength of 15,000 pounds per peripheral inch (3750 psi) established for the prototype bonded end ring case can be achieved. (Author)

AD-290 600 Div. 12, 6, 5
(TISTW/RD) OTS price $.50

Electromagnetic Warfare and Communications Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
EFFECTS OF RE-ENTRY PLASMA SHEATH ON TELEMETRY TRANSMISSION. PART I. TELEMETRY AND THE PLASMA SHEATH.
Report on Telemetry and Command Destruct,
by Chester A. Hines. Sep 62, 10p. 1 ref.
(Proj. 4107)
(ASD TDR 62-714, pt. 1)
Unclassified report

DESCRIPTORS: *Telemetering data, *Telemetering, Gas ionization, Propagation, Radio waves, Wave transmission, Re-entry vehicles, Radio transmission, Plasma physics, Atmosphere entry.

An initial approach to solution of the complex telemetry-plasma interaction problem is presented. The telemetry system is defined and the complexity of the re-entry plasma is discussed, with emphasis on the unpredictable physical and electrical nature of the sheath. No attempt is made to suggest a rigorous solution because the state-of-the-art is obviously not well enough advanced. (Author)

AD-290 665 Div. 12
(TISTA/SEB) OTS price $1.60

Atlantic Research Corp., El Monte, Calif.
METHOD OF COMPUTING DISPERSION EFFECT DUE TO THRUST MISALIGNMENT,
by Bruce M. Bohi. 25 Oct 62, 9p. incl. illus.
(Doc. no. 02-110-001; SVD rept. no. 7921-01)
(Contract AF 04(694)220)
(BSD TDR 62-338) Unclassified report

DESCRIPTORS: *Thrust, Terminal ballistics, Flight paths, Errors, Guided missiles, Guided missile noses, Theory, Guided missile trajectories, Mathematical analysis.

There are two basic operations required to compute the dispersion due to thrust misalignment. The first operation is insertion of the proper data into the 6 degree of freedom computer program. The second is the conversion of the computer output to an impact point deviation. Data are entered into the computer program by means of two constants. The first constant, denoted A for convenience, is multiplied by the thrust to give the normal component of thrust in some selected angular plane. This angular plane is located with respect to the body axis system of the vehicle and generally is coincident with either the pitch or yaw plane. The second constant, denoted B, is multiplied by the thrust to give the moment about the vehicle center of gravity in the plane of A. Physically, B represents the product of A and the distance along the longitudinal axis from the nozzle exit plane to the missile center of gravity. (Author)

AD-290 726 Div. 12
(TISTA/SEB) OTS price $5.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
ROCKET-BORNE IONOSOUNDER EQUIPMENT DEVELOPMENT,
by Leonard C. Humphrey. Aug 62, 50p. incl. illus. table (Scientific rept. no. 2)
(Contract AF 19(604)7221, Proj. 4649)
(AFCRL 62-900) Unclassified report

DESCRIPTORS: *Satellite vehicles, Ionosphere, Perturbation theory, Radar transmitters, Radar receivers, Satellite vehicle antennas, High frequency, Plastics, Pneumatic devices, Inverted rectifiers, Programming, Power supplies, Tests, Electrons, Density, Scientific research, Instrumentation.

The equipment consists of a three-frequency topside ionospheric sounding system capable of measuring natural gradients and man-made perturbations in the topside of the ionosphere. The equipment configuration is designed specifically for inclusion in the Convair Atlas Experimental Pod program. Equipment that has been fabricated includes a 250-watt transistor high-frequency radar transmitter, receiver, programmer, power inverter, and inflatable plastic HF antenna structures. (Author)

AD-290 745 Div. 12
(TISTP/TL) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
DURATION OF AN INTERRUPTED COUNTDOWN,
by Sidney I. Firstman. 27 Sep 62, 33p. 1 ref.
(Technical rept. no. 65)
(Contract Nonr-22553; Proj. NR 042-002)
Unclassified report

DESCRIPTORS: *Sattelite vehicles, *Launching, Ground support equipment, Statistical distributions, Time, Test methods.

A countdown could be interrupted by several kinds of problems and following each interruption, it could continue according to one of several policies; seven such policies are considered in this analysis. The problem addressed is that of accounting for the randomly occurring problems and the time required to deal with them when estimating the distribution of interrupted countdown durations. The countdown is considered as an interrupted service process, and expressions are derived from which the moments of the interrupted countdown duration distribution can be obtained. The first two moments are derived explicitly. (Author)

AD-290 800 Div. 12
(TISTA/SEB) OTS price $.75

Armed Services Technical Information Agency, Arlington, Va.
SCIENTIFIC SATELLITES. AN ASTIA REPORT BIBLIOGRAPHY,
comp. by Sara E. Bjorge. 12 Dec 62, 24p.
120 refs.
Unclassified report

DESCRIPTORS: *Satellite vehicles, Design, Instrumentation, Meteorology, Ionosphere, Scientific research, Satellite vehicle research, Bibliography.

This is a select bibliography which covers the design and instrumentation of scientific satellites, properties of the ionosphere derived from satellite research, and meteorological satellites. This bibliography was prepared for the use of those attending the Scientific Satellite Symposia sponsored by the American Astronautical Society, held on December 27, 1962.

AD-290 816 Div. 12
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
REVIVED INTEREST IN F. A. TSANDER'S WORK ON SPACE FLIGHT.
13 Nov 62, 3p. (AID rept. no. 62-179; Trans. from Moskva, Oborongiz, 1961 and Aviatsiya i kosmonavtika 45:26-31, 1962)
Unclassified report

DESCRIPTORS: *Space flight, USSR, Translations, Gravity, Meteors, Solar energy, Magnetic fields, Electrostatics.

An article by F. A. Tsander entitled 'Flight With the Aid of Reaction Vehicles' is noted. The following topics were mentioned: use of electrostatic force; use of magnetic force; use of solar energy; generation of solar attraction; and protection from meteors and dust.

AD-290 819 Div. 12, 27
(TISTA/SEB) OTS price $8.10

Ion Physics Corp., Burlington, Mass.
(No title).

Quarterly technical progress rept. no. 1, 1 June-13 Aug 62,
by A. Lucile Cox. 17 Sep 62, 74p. incl. illus. tables.
(Contract AF 33(657)8743, Proj. 3048)
Unclassified report

DESCRIPTORS: *Electric propulsion, *Ion rockets, Ions, Ionization, Sodium, Mercury, Cadmium, Colloids, Electric arcs, Ion sources, Ion beams, Magnetic fields, Colloids, Electrostatics.

Experimental studies of three types of ionizers were conducted. Ion extraction from the contained arc is difficult, so that only low currents and charge-to-mass ratios can be obtained with this type of source. The free arc and corona ionizers produce useful ion currents, but the investigation of these ionizers indicates a need for beam focusing and removal of electrons from the colloidal ion beam in the growth region. A new colloidal ion source was fabricated to study the effect of magnetic fields in the ionization region to accommodate propellant materials which require higher operating temperatures. This source will be operated in a new vacuum tank. A collector was fabricated to permit accurate evaluation of mass beam collimation. A quadrupole mass spectrometer has been employed in some experiments, but no charge-to-mass ratio measurements have been achieved with it yet. Hot wire anemometers have been obtained to investigate a new technique for detecting the presence of colloidal material. Tables and graphs of flow data were prepared for use over the mass flux range of interest. Analysis of the nucleation process indicates that sodium vapor would form a considerable amount of uncharged colloidal material as well as the charged particles. Cadmium and mercury seem much more likely to undergo preferential ionic nucleation. (Author)

AD-290 828 Div. 12
(TISTA/SEB) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SELECTED ARTICLES FROM BULLETIN OF THE STATIONS FOR OPTICAL OBSERVATION OF ARTIFICIAL EARTH SATELLITES.
25 Oct 62, 26p. incl. illus. table, 5 refs.
(Trans. no. FTD-TT-62-861 from Byulleten Stantsii Opticheskogo Nablyudeniya Iskusstvennykh Sputnikov Zemli 8:pp. 3-13, 20-23, 1960)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Photography, Cameras, Photographic analysis, Mathematical analysis, Equations, Theory, USSR, Translations, Tracking telescopes, Optical tracking.

Contents:
Determining the scale of astrophotographs and the angular velocity of a fast-moving celestial body
Modification and study of the shutter of the NAFA 3c/25 camera at Kharkov
Observations of satellites with a TZK telescope fitted with a camera for photographing readings
An instrument for recording the brightness of a satellite and determining the period of change
The period of change of brightness of the rocket of the theird Soviet artificial earth satellite from observations at the Sofia Astronomical Observatory
The results of photographic observations of artificial earth satellites
Engelhardt Astronomical Observatory, Kazan
Tashkent Astronomical Observatory of the Academy of Sciences of the Uzbek SSR

AD-290 833 Div. 12
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ATMOSPHERE OF THE SPACE SHIP,
by Yuriy Ivanov. 25 Oct 62, 5p. (Trans. no. FTD-TT-62-1545 from Sovetskaya Latviya 194, 17 Aug 62)
Unclassified report

DESCRIPTORS: *Spaceship cabins, USSR, Translations, Closed cycle ecologiclal systems, Controlled atmospheres.

AD-290 930 Div. 12
(TISTW/PCR) OTS price $1.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART 02 CURVATURE IN RIGID RAIL LAUNCHERS MODELS.
Technical rept. on Dynamics of Missile Launchers,
by D. Penrod and M. Stern. Sep 62, 17p. incl. illus. (T and AM rept. no. 226)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)
Unclassified report

DESCRIPTORS: *Rocket launchers, *Guided missile launchers, Curved profiles, Equations, Mathematical analysis, Analog computer. Motion, Railroad tracks.

An analysis of the single degree of freedom model of rigid rail launchers including the effects of arbitrary rail curvature and tipoff is presented. The equations are put in a form suitable for solution by analog computer and some illustrative numerical results are presented. (Author)

AD-291 074 Div. 12
(TISTW/RD) OTS price $1.60

AVCO Everett Research Lab., Mass.
THE PROSPECTS FOR ACTIVE SHIELDING,
by R. H. Levy. Nov 62, 14p. incl. illus. table, 4 refs. (Rept. no. AMP 94)
(Contract Nonr-252(00)
Unclassified report

DESCRIPTORS: *Shielding, *Satellite vehicles, Electrostatic fields, Magnetic fields, Protons.

A review is given of the reasons for the interest in active shielding and the types of missions for which an active shield would be particularly desirable are discussed. Recent work on active shielding is reviewed. Electrostatic shielding is discussed. In general, the maintenance of an electrostatic field for shielding purposes will require the expenditure of power owing to the presence of a neutral highly conducting plasma. Estimates of the power required are extremely high, and electrostatic shielding appears unattractive. Magnetic shielding is discussed. The virial theorem on the weights of magnetic field coils in space is explained, and it is shown how this theorem can be used to make a direct comparison between the use of a material as an element in a structure and as a stopping material for energetic protons. The result of this comparison is that for sufficiently large sizes magnetic shielding will always be superior, but that the sizes involved are extremely large. The way in which the critical size scales with the strength to weight ratio for structural materials and the magnetic field strength is discussed. This general view is supplemented by a review of the status and prospects for large superconducting radiation shields with particular emphasis on

those features which are likely to make the minimum weights estimated by the virial theorem unduly optimistic. The possibility of shielding a space craft by blowing a hole in the interplanetary magnetic field (along which the protons move) with an atomic bomb is mentioned. It appears that such a shield would violate Liouville's theorem. (Author)

AD-291 089 Div. 12
(TISTA/SEB) OTS price $4.60

RAND Corp., Santa Monica, Calif.
SATELLITE COVERAGE PROBABILITIES,
by Barry W. Boehm. Oct 62, 39p. incl. illus. 4 refs. (Memo. no. RM-3297-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, Mathematical analysis, Equations, Rotation, Earth, Ground support equipment, Integral equations, Probability, Digital computers, Distribution, Optical tracking.

A method is presented for calculating the average number of times a satellite's ground track comes within a specified distance of a point on earth during a given time interval and numerical results for several typical cases are given. The method is applicable to the critical side range problem in satellite interception or rendezvous, the ejection of objects from orbit to points on earth, observation and communication satellites, etc. A relation is developed for the fraction of a parallel of latitude which can be covered by a satellite, with a given side range capability, during a single orbital revolution. The result is analyzed, considering the probability that a point on the parallel of latitude can be covered by a randomly oriented satellite and considering the average number of coverages during a single orbital revolution. The results of programming the method on a digital computer are presented and analyzed. Coverage probabilities are given in other studies of satellite systems, such as determining the probability that at least on of a number of randomly oriented satellites is able to communicate with a point on earth, or evaluation possible operational inclinations of a satellite orbit relative to ground system coverage. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-290 731 Div. 13
(TISTM/EJH) OTS price $8.60

Illinois U., Urbana.
EXPERIMENTAL STUDIES OF DYNAMICALLY LOADED FOOTINGS ON SAND,
by Walter E. Fisher. July 62, 87p. incl. illus. tables, 17 refs. (Civil engineering studies, soil mechanics series no. 6)
(Contract DA 22-079-eng-240)
Unclassified report

DESCRIPTORS: *Sand, *Surfaces, *Applied mechanics, Loading, Mechanics, Mechanical properties, Soils, Dynamics, Test methods, Failure (Mechanics), Test equipment, Gages, Instrumentation, Mathematical analysis, Analog computers.

An investigation of the strength and behavior of spread footings subjected to dynamic forces is reported. To this end a single-degree-of freedom model representing the spread footing and its supporting medium was developed. The supporting medium was restricted to either a cohesive or cohesionless soil. Tests were conducted to aid in the correlation of the model components with the anticipated response behavior of spread footings. A correlation between the analytical model and the experimental results could not justifiably be carried out as the container affected the test medium. Results showed a finite increase in the dynamic bearing capacity of spread footings over their static capacity. Within the limited instrumentation, the dynamic settlement of the test plates is due to the establishment of failure surfaces. For settlements equal to the maximum dynamic settlement, the applied dynamic load varied from 1.20 to 2.28 times the equivalent static load. (Author)

14. MATERIALS (NON-METALLIC)

AD-289 601 Div. 14, 17, 26
(TISTM/BRW) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - AF-31 BONDS TO MAG THORIUM ALLOY - OVERLAP SHEAR STRENGTH - DETERMINATION OF.
Test data memo.,
by J. R. Hooker. 14 Mar 57, 9p. incl. tables.
(Rept. no. FTDM-1633)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Magnesium alloys, *Thorium alloys, *Sheets, Metal joints, Bonded joints, Adhesives, Shear stresses, Airframes, Bonding.

The overlap shear strength of Dow #1 treated magnesium-thorium alloy bonded with AF-31 adhesive was determined and tabulated. (Author)

AD-289 602 Div. 14
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - FMS-0016 (PLASTILOCK 620-626) - LAP SHEAR SPECIMENS OF - ADHESIVE ALLOWABLES ON - TESTS FOR.
Test data memo.,
by J. E. Thomas. 11 Aug 58, 11p. incl. illus. tables (Rept. no. FTDM-1966)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Bonding, Airframes, Loading, Test methods, Temperature, Shear stresses, Stresses, Failure (Mechanics), Tables, Aluminum.

Slow uninterrupted load rates had no effect on bond strength of FMS-0016 adhesive bonded specimens with 0.5, 1.0 and 1.63 in. overlaps when tested at -67, 80, 180 and 260 F. The bond strengths of FMS-0016 adhesive test specimens were affected when tested at 260, 180 and 80 F by a loss in strength when held for interrupted and extended load periods at 75 and 90% of the predetermined ultimate load levels of the particular overlap specimens. The bond strength of FMS-0016 adhesive at -67 F was not affected when held for interrupted and extended load periods at the predetermined ultimate load level for .50, 1.0 and 1.63 inch overlap specimens.

Division 14 - MATERIALS (NON-METALLIC)

AD-289 603 Div. 14
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - THIOKOL ''ST'' FILLET - SELF-ABSORPTION AND SELF-SHIELDING STUDY.
Test data memo.,
by J. W. Swain. 10 June 58, 9p. incl. illus. tables (Rept. no. FTDM-1945)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Elastomers, *Synthetic rubber, Sheets, Radiation effects, Shielding, Tensile properties, Mechanical properties, Neutron flux density.

The tensile strength, stress at each 100% elongation, ultimate elongation and percent compression set were determined on Thiokol ''ST'' elastomer before and after irradiation at one flux at ambient temperature. No definite conclusions can be reached regarding the self-absorption and self-shielding properties of Thiokol ''ST'' fillets. However, the data indicates that some self-absorption and self-shielding occurred with Thiokol ''ST''. (Author)

AD-289 695 Div. 14
(TISTM/BRW) OTS price $4.60

Bell Aerosystems Co., Buffalo, N. Y.
MODULUS OF RUPTURE TESTS ON PYROLYTIC GRAPHITE.
by Leon Marcus. 31 Aug 62, rev. 31 Oct 62, 39p. incl. illus. tables, 5 refs. (Rept. no. BLR 62-13(M) rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Graphite, Mechanical properties, Rupture, Elasticity, Stresses, Deformation, Load distribution, Tests.

Rectangular pyrolytic graphite bars were tested at room temperature for modulus of rupture and bending modulus of elasticity. A two point loading system was used in conjunction with automatic recording devices to obtain continuous load vs deflection curves. These data were converted to stress-strain curves and are incorporated in the body of the report. The rather low strength values observed for the pyrolytic graphite samples stimulated additional work. An analysis was conducted to verify the possibility that these results were caused by a delamination phenomenon which to some degree is characteristic of this material. This report includes photomicrographs and x-rays of the fractured and sheared areas. Bulk density values calculated from the dimensional data are also included. (Author)

AD-289 848 Div. 14
(TISTM/TCG) OTS price $.75

Union Carbide European Research Associates, Brussels (Belgium).
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XI. CHARACTERIZATION OF BINDERS USED IN THE FABRICATION OF GRAPHITE BODIES.
Rept. for 1 Jan-31 Dec 61 on Refractory Inorganic Non-Metallic Materials,
by E. de Ruiter, A. Halleux and others. Sep 62, 23p. incl. illus. tables, 18 refs.
(Subcontract to National Carbon Co., Inc., Cleveland, Ohio, Contract AF 33(616)6915, Proj. 7350)
(WADD TR 61-72, vol. 11)
Unclassified report

DESCRIPTORS: *Graphite, *Coal tar, *Pitch, *Binders, Pyrolysis, Chemical properties, Physical properties, Density, Molecular weight, Chromatographic analysis, Electrical conductance, Spin, Resonance, Solubility, Pyridines, Light, Absorption, Ultraviolet spectroscopy, Solvent extraction, Vapors, Benzene.

A series of chemical and physical methods, previously developed for use in the study of the constitution of coals, has been applied to the definition of structural parameters for thirteen tar and pitch samples which have a wide range of properties and which are of interest in the fabrication of graphite bodies. Information obtained on the molecular size and composition indicates the presence of polycyclic compounds with a high degree of aromaticity. Evidence also points to the importance of large aromatic clusters. (Author)

AD-289 856 Div. 14
(TISTM/ODN) OTS price $3.00

Minnesota U., Minneapolis.
BIBLIOGRAPHY AND TABULATION OF DAMPING PROPERTIES OF NON-METALLIC MATERIALS.
Final rept., June 57-Sep 60 on Metallic Materials,
by Sun Hwan Chi. Sep 62, 147p. incl. illus. tables, refs.
(Contract AF 33(657)7453, Proj. 7351)
(WADD TR 60-540) Unclassified report

DESCRIPTORS: *Bibliography, *Materials, Elastomers, Rubber, Synthetic rubber, Plastics, Laminates, Fibers, Solutions, Liquids, Test methods, Theory, Test equipment, Physical properties, Energy, Coding, Damping, Synthetic fibers.

This bibliography contains a nearly complete list of references on the damping properties of non-metallic materials for the period from 1929 to 1959, together with an index of nomenclature, units, and test methods. Tabulations of the in-phase and out-of-phase components of Young's modulus and the shear modulus for the various materials are also shown, and graphical representations of experimental data indicate the loss factor values for different materials. These values of the loss factor are compared to those of the representative structural metals. A detailed code classification system for the field of damping is also described, and an abstract of each referenced article together with a coded supplement is also included in this report. The code is provided to aid those using the ASM-SLA punch-card system. (Author)

AD-290 051 Div. 14, 12, 9
(TISTM/EJH) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE ABLATION OF GRAPHITE IN DISSOCIATED AIR. PART II. EXPERIMENTAL INVESTIGATION,
by N. S. Diaconis, P. D. Gorsuch, and R. A. Sheridan. Sep 62, 20p. illus. (Rept. no. R62SD86)
Unclassified report

Presented at the IAS National Summer Meeting, June 19-22, 1962, Los Angeles, California.

DESCRIPTORS: *Graphite, *Ablation, *Aerodynamic heating, Refractory materials, Re-entry vehicles, Thermal insulation, Hypersonic wind tunnels, Electric arcs, Air, Dissociation, Reaction kinetics, Diffusion, Gas flow, Enthalpy, Test equipment.

An experimental investigation was conducted to study the oxidation performance of ATJ graphite

in dissociated air. To characterize the behavior of such a material in a re-entry environment requires the proper simulation of certain free flight flow field parameters which greatly influence material performance. For good experimental simulation it is desirable to establish in the test facility at least the following: stagnation enthalpy of the gas stream, model pressure, flow chemistry and aerodynamic shear. Tests were conducted in a hypersonic arc wind tunnel in which the material mass loss was correlated as a function of model surface temperature. The data obtained indicated two specific zones of material performance, one in which the rate of the reaction between the oxygen species and the material governs the mass loss and the other in which the rate of diffusion of the oxygen-bearing species to the surface is dominant. Comparison of these experimental data with the theory of Scala showed good agreement. (Author)

AD-290 069 Div. 14, 17
(TISTM/BRW) OTS price $8.60

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS.
Oct 62, 73p.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Bibliography, *Materials, Alloys, Metals, Graphite, Ceramic materials, Refractory materials, Coatings, Composite materials.

Contents:
High-strength alloys: Cobalt base, nickel base, engineering steels, Stainless steels, iron base
Light metals: Beryllium, titanium, magnesium
Nonmetallics: Carbon graphite, special refractories, ceramic oxide
Refractory metals: Niobium, chromium, molybdenum, tantalum, vanadium, tungsten, platinum group
Miscellaneous: Coatings, application, composites

AD-290 273 Div. 14
(TISTM/BRW) OTS price $1.50

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF SINTERABLE MgO POWDERS AND CERAMICS MADE FROM THEM.
Final rept., 1 Jan 61-31 May 62 on Refractory Inorganic Nonmetallic Materials,
by M. J. Snyder, A. Rudnick and others. Oct 62, 48p. incl. illus. tables, 27 refs.
(Contract AF 33(616)7733, Proj. 7350)
(ASD TDR 62-700) Unclassified report

DESCRIPTORS: *Ceramic materials, *Magnesium compounds, *Oxides, Powders, Density, Microstructure, Processing, Mechanical properties, Tests, Hydrostatic pressure, Crystal structure, Fracture (Mechanics), Pyrolysis, Microstructure, Sintering.

The fabrication of dense reproducible specimens suitable for strength measurements and having controlled microstructural differences was attempted. A sinterable high-purity magnesia powder, developed in an earlier phase of the program, was used. Procedures used earlier to produce small, rather crude specimens, could not be applied directly to controlled production of the quantity of large specimens needed. The sintered densities of the larger specimens were lower, and the variability from one lot to the next was greater. The major source of variability appeared to reside in the isostatic pressing operation. This unexpected sensitivity to forming conditions other than pressure suggests the need for further research on processing effects in ceramics made from sinterable powders. A portion of the effort was devoted to analysis and development of the diametral-compression test wherein short cylinders are broken by applying a load across a diameter. Procedures were established for measuring a tensile strength by this method. (Author)

AD-290 275 Div. 14, 8, 12
(TISTM/BRW) OTS price $2.50

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
HIGH TEMPERATURE CERAMIC STRUCTURES.
Final summary rept., 1 Nov 61-31 Oct 62,
by N. E. Poulos, S. R. Elkins and others.,
31 Oct 62, 108p. incl. illus. tables.
(Contract NOrd-15701, Proj. A-212)
Unclassified report

DESCRIPTORS: *Ceramic materials, *Radomes, High temperature research, Silicon compounds, Dioxides, Casting, Flame spraying, Impregnation, Aluminum compounds, Chlorides, Porosity, Mechanical properties, Processing.

Investigations were concerned with (1) radome fabrication and material evaluations, and (2) arc-plasma flame glazing of slip cast fused silica. The larger effort was expended in the latter area. A procedure was developed for pressure casting radomes from fused silica slip, which provided a casting time of 80 min, which was an approximate reduction of 9 hr in casting time using conventional slip-casting procedures, to form a 3/8-in. thick x 15-in. diam x 32-in. high radome. The effect of pressure casting on the slip properties of the drained slip was determined by particle size analysis, percentage solids concentration, and slip density. The results indicated that the properties of the drained slip were not affected by pressure casting; and therefore, the drained slip could be reused repeatedly. A furnace to facilitate firing large radome shapes was designed and constructed. It is capable of firing slip-cast fused silica radomes up to 15-in. in diam x 32-in. in height to a temperature to 2600 F. Radomes can be loaded or unloaded in this furnace in approximately 2-4 minutes with a drop in furnace temperature during this period of only 150 F. (Author)

AD-290 279 Div. 14
(TISTM/EJH) OTS price $.75

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
IMPROVEMENT OF REINFORCED PLASTICS.
Quarterly progress rept. no. 5, 1 July-30 Sep 62.
31 Oct 62, 23p. incl. illus. table, 1 ref.
(Contract NOw 61-0613-d)
Unclassified report

DESCRIPTORS: *Composite materials, *Plastics, *Glass textiles, *Synthetic fibers, Reinforcing materials, Fibers, Mechanical properties, Tensile properties, Elasticity, Stresses, Shear stresses, Failure (Mechanics), Deformation, Rods.

Work during this period has included: transverse and axial compression tests, and bending tests of solid and hollow fiber composites; axial tension tests of single solid and hollow fibers; computation of transverse moduli of uniaxially stiffened composites as a function of plastic volume fraction and inner to outer fiber radii ratio. (Author)

AD-290 280 Div. 14
(TISTM/ODN) OTS price $5.60

Illinois U., Urbana.
MICROSCOPIC STUDY OF MODE OF FRACTURE IN FILAMENT WOUND GLASS-RESIN COMPOSITES,
by Charles Anton Bouc. Nov 62, 31p. illus. tables, 10 refs. (Technical memo. no. 189, T&AM rept. no. 234)
(Contract Nonr-294702, Proj. 62-R05-19A)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Laminated glass, *Resins, *Composite materials, Microscopes, Microscopy, Simulation, Fracture (Mechanics), Tensile properties, Microphotography, Bonding, Loading, Manufacturing methods, Tests, Mechanical properties.

Filament wound glass-resin specimens were successfully developed to approximately simulate a typical filament wound composite such as found in pressure vessels and fuel tanks. During tensile loading, each specimen was carefully scanned thru a microscope at a magnification of x200, and a written and photographic record was made of the progress of the fracture phenomena. The information thus obtained was synthesized into identification of five different microscopic modes of fracture. The origin and nature of these different fracture modes was investigated with the aid of microphotographs, and their contribution to the progressive and ultimate fracture of the specimens determined. (Author)

AD-290 309 Div. 14, 25
(TISTM/BRW) OTS price $5.60

Du Pont de Nemours, E. I., and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 3, 1 Jan-31 Mar 62,
by W. T. Hicks and J. T. Looby. 18 May 62, 32p. illus.
(Contract NObs-84824, Proj. SR-007-12-01)
Unclassified report

DESCRIPTORS: *Semiconductors, *Selenides, *Tungsten compounds, *Molybdenum compounds, Tellurides, Thermoelectricity, Solubility, Electrical properties, Hall effect, Chemical impurities, Tantalum, Niobium, Rhenium, Materials.

The solubility and electrical effects of cation substituents, anion substituents, interstitial solutes and deviations from stoichiometry in WSe_2 and, to a lesser extent, in $MoSe_2$ were studied quantitatively. The p-type composition $W.99Ta.01Se_2$, continues to be the best thermoelectric material in this system, with a Figure of Merit of 0.0007 -3/deg at 600 C. Hall effect measurements and related data for Ta-doped WSe_2 can be interpreted consistently on the basis of a simple extrinsic semiconductor model. A re-examination of encapsulation problems with W led to the decision to use prefabricated ceramic tubes with ferrous metal end caps for protection against degradation at high temperatures, rather than Sauereisen cement coatings. (Author)

AD-290 494 Div. 14, 31
(TISTM/EJH) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
AN INVESTIGATION OF THE MATERIAL PARAMETERS INFLUENCING CREEP AND FATIGUE LIFE IN FILAMENT WOUND LAMINATES.
Quarterly rept. no. 3, 26 July-26 Oct 62,
by H. R. Nelson, R. H. Cornish, and J. W. Dally. Nov 62, 40p. incl. illus. tables (Rept. no. 9)
(Contract NObs-86461, Proj. SF-013-05-03)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Glass textiles, *Laminates, *Pressure vessels, High pressure research, Hydrostatic pressure, Composite materials, Reinforcing materials, Mechanical properties, Creep, Fatigue (Mechanics), Density, Underwater, Resins, Impregnation, Test equipment, Filament wound construction.

The objective of this program is to study the behavior of glass reinforced filament wound plastics when subjected to compressive states of stress, i.e. creep and fatigue behavior under uniaxial compressive stress and in biaxial compression. After establishing the general characteristics of the creep and fatigue effects the investigation will be redirected toward a study of the material parameters. The ultimate goal will entail the development of a composite reinforced laminate which will exhibit a compressive strength of 150,000 psi and a compressive modulus of 10,000,000 with a maximum density of 0.08 lbs/cu in. Moreover, this material must exhibit a high endurance limit (based on a 50,000 cycle life) and a low creep rate when subjected to stress levels produced by hydrostatic pressures comparable to those encountered with deep diving vehicles. (Author)

AD-290 543 Div. 14, 17, 32
(TISTM/TCG) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
METHODS FOR LINING OR COATING INSTALLED METAL PIPING. A LITERATURE SURVEY,
by T. Roe, Jr. and R. L. Alumbaugh. 14 Nov 62, 3p. 8 refs. (Rept. no. TN-455)
Unclassified report

DESCRIPTORS: *Metals, *Pipes, *Metal coatings, Corrosion, Plastics, Corrosion inhibition, Cleaning, Organic materials, Acids, Chemicals, Literature, Coatings.

Two methods are discussed, either of which can be used for the repair of in-place piping which is corroded internally: (1) cleaning followed by coating with an organic material, and (2) installation of a plastic liner. Field experience has shown that both methods are effective. (Author)

AD-290 572 Div. 14, 25, 8
(TISTM/BRW) OTS price $2.60

Melabs, Palo Alto, Calif.
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS.
Quarterly progress rept. no. 2, 17 June-16 Sep 62,
by Roy W. Roberts and Lee F. Donaghey. 16 Sep 62, 21p. incl. illus. table, 2 refs.
(Contract DA 36-039-sc-89206)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Ferrites, *Parametric amplifiers, Amplifiers, Magnetic amplifiers, Microwave amplifiers, Electrical properties, Garnet, Resonance, Dielectric properties, Cylindrical bodies, Spheres, Microwaves.

The rationale for the operation of the ferrimagnetic parametric amplifier in the magnetodynamic mode of operation is presented. Cylindrical geometry of the dielectric resonator is

chosen to allow loading of pump energies at calculable mode resonance frequencies. Possible modes for parametric excitation are given, and selection rules for resonator mode coupling to Walker modes are derived. Resonance conditions for dielectric resonator modes are derived: the secular equation is derived for azimuthal eigenvalues of zero and one, and graphical solutions given. Mode selection schema are discussed with respect to noise figure. Experimental data is shown for magnetodynamic HE sub 112 and TE sub 013 modes, and variation of inferred Q and splitting factor with sample dimension reported. Results of initial tuning methods for signal and pump modes are given. (Author)

AD-290 611 Div. 14, 27
(TISTM/TCG) OTS price $19.75

Oklahoma State U. School of Mechanical Engineering, Stillwater.
A STUDY IN THE FIELD OF FLUID SEALS FOR HIGH SPEED ROTATING EQUIPMENT.
Rept. no. 1, 2 Feb-31 Aug 59 on Fluid Seals Project,
by R. E. Chapel, M. E. Schlapbach, and L. E. Hall. Sep 59, 306p. incl. illus. tables, refs.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Hydraulic seals, *Seals, *Rotary seals, *Rotary pumps, Bibliography, Reciprocating pumps, Elastomers, Carbon seals, Plastic seals, Flanges, Bushings, Screw threads, Piston rings, Synthetic rubber, Polymers, Gaskets, Asbestos fibers, Rubber seals, Fluorocarbons, Leather, Silicones, Metal seals, Friction, Failure (Mechanics), Fluid mechanics, Packaging.

Many types of seals have been designed for use in reciprocating or rotating machines. In recent years, particularly in military applications, the sealing problem has become complex. High contact speeds, extreme temperatures, and superpressures have presented the designer with some challenging problems. The seals for new applications usually are developed by extrapolating data from previous designs. Most of the recent investigations have been experimental evaluations of new materials. The wear rate, leakage, and frictional drag of the material are observed over a range of speeds, temperatures and pressures. There is little evidence in the literature of analytical studies that pertain to dynamic fluid seals. A few types, such as the Labyrinth Seal, have a well developed theoretical analysis. (Author)

AD-290 617 Div. 14, 29, 26
(TISTM/ODN) OTS price $1.75

Quartermaster Research and Engineering Command, Natick, Mass.
RAPID SOLE LEATHER TANNAGE USING DOMESTIC MATERIALS,
by Ludwig Seligsberger. Oct 62, 60p. incl. tables, 58 refs. (Footwear and Leather Series rept. no. 16)
(Proj. 7-93-07-009)
Unclassified report

DESCRIPTORS: *Shoes, *Leather, *Tannic acids, Impregnation, Fibers, Processing, Organic acids, Sulfonates, Aldehydes, Formaldehyde, Storage, Tests, Stability.

The problem of providing domestic replacements for imported tanning materials in the manufacture of heavy leather is discussed. Previous studies undertaken mainly to cover military emergency requirements are reviewed. A new approach taken by the Quartermaster Corps came after a thorough exploration of the tanning properties of aliphatic aldehydes. These studies culminated in the development of an original rapid-tanning process for sole leather using glyoxal and formaldehyde in fairly concentrated solutions of mild alkalies, followed by the fixation of lignosulfonates from heated liquors. Bleaching and loading operations were conventional, except that no imported extracts were used. The entire tanning process requires only 3 to 4 days if drums are used throughout (as for insole leather) and about twice as long if the fixation of lignosulfonate takes place in rocker vats. The feasibility of the new process was established by pilot plant runs in 2 tanneries and by wear-testing the leather thus obtained in dress shoes, men's, oxford. The stability of the new leather after prolonged storage under various climatic conditions typical for Army warehouses was also examined. (Author)

AD-290 654 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SPECIFICATION MIL-P-25515 QUALIFICATION ON MATERIAL - FIBERGLASS LAMINATE - FIBERGLASS CLOTH NO. 181 VOLAN A - CONOLON 506 PHENOLIC RESIN (NARMCO RESINS AND COATINGS CO.),
by G. E. Gardner, Jr., P. W. Bergstedt, and H. C. Turner. 5 May 59, 9p. incl. tables, 1 ref. (Rept. no. 8926-049)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Laminates, *Glass textiles, *Resins, Tensile properties, Elasticity, Impregnation, Phenolic resins, Tests, Specifications, Mechanical properties.

Qualification tests were made in accordance with Mil-P-25515 for Type I, Class II, 0.125 inch thick laminates made of 12 plies No. 181 Volan A fiberglass cloth impregnated with Narmco Conolon 506 resin. Tests were as follows: flexural flatwise ultimate strength, flexural initial modulus of elasticity, compression ultimate strength, and tensile ultimate strength. (Author)

AD-290 658 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECTS OF ATMOSPHERIC HUMIDITY ON BOND STRENGTHS ON MATERIALS - ADHESIVES AND CEMENTS - METLBOND 4021 (NARMCO RESINS AND COATINGS, INC.), SCOTCH-WELD AF-10 (MINNESOTA MINING AND MANUFACTURING CO.) ADHESIVE TAPES,
by H. R. Barringer, G. L. Picotte, and E. E. Keller. 13 May 58, 18p. incl. illus. tables, 1 ref. (Rept. no. 8926-059)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Adhesive tapes, *Adhesives, Humidity, Bonding, Atmosphere, Adhesion, Light, Transmission, Absorption, Materials, Water, Tests, Tensile properties, Desiccants, Processing.

Test results indicated that exposure of uncured tape to relative humidity from 75 to 100% is detrimental to the bond strength of Metlbond 4021 adhesive at -67 F, room temperature, and at 300 F. Scotchweld AF-10 is also affected, but to a lesser degree. Metlbond 4021 adhesive absorbs water from the atmosphere at 100% relative humidity in larger quantities than AF-10, adding as much as 50% of its own original weight of water. Both adhesives appear to reach equilibrium with atmospheric humidity in about 24 hours. They continue to absorb water at decreasing rates after exposures of two weeks or more to 100% relative humidity. (Author)

AD-290 659 Div. 14, 10
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
PHYSICAL PROPERTIES ON MATERIAL - FUELS AND LUBRICANTS - RP-1 FUEL,
by J. G. Malik, F. W. Graber, and E. E. Keller.
11 Dec 58, 10p. 1 ref. (Rept. no. 8926-065)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Fuels, Physical properties, Density, Viscosity, Thermal conductivity, Viscosimeters, Thermal expansion, Density-sensitive indicators, Thermal expansion, Specific heat, Liquids, Solids.

The density and viscosity of RP-1 fuel were determined by use of a modified Sprengel type pycnometer and a standard Ostwald viscometer, respectively. The thermal conductivity of liquid and solid RP-1 and the linear coefficient of thermal expansion of the solid RP-1 were determined with special apparatus. The specific heat and cubical coefficient of thermal expansion of liquid and solid RP-1, respectively, were calculated from appropriate physical data. The data obtained were as follows: (a) density of liquid, 0.7967 ± 0.0005 cm/ml at 25 C, 0.7987 - 0.0036 (t C - 25.0) cm/ml, -45 to + 25 C; viscosity, 1.96 cp or 0.0245 stoke at 20 C; thermal conductivity of liquid (332 ± 5) x 10 to the -6th power cal gm/sq cm sec deg at 28 C; thermal conductivity of solid (6.4 ± 1.0) x 1/10,000 cal cm/sq cm sec deg at 78 C, 10.0 x 1/10,000 cal cm/sq cm sec deg at -196 C (estimated); specific heat of liquid, +0.53 cal/gm deg at 28 C; cubical coefficient of expansion of liquid, (8.7 ± 0.1) x 1/10,000 cc/cc deg from -40 to 25 C (calculated); linear coefficient of expansion, (61 ± 4) x 10 to the -6th power cm/cm deg -190 to +50 C. (Author)

AD-290 660 Div. 14
(TISTM/ODN) OTS price $6.60

General Dynamics/Convair, San Diego, Calif.
SCREENING FOR AERODYNAMIC HEAT RESISTANCE CHARACTERISTICS FOR MATERIAL - INSULATIVE - THERMAL - ORGANIC AND INORGANIC HOLLOW SPHERES - COMPRESSED GLASS FIBERS - PHENOLIC HONEYCOMB,
by H. H. Stier, E. E. Keller, and W. M. Sutherland. 4 Feb 58, 47p. incl. illus. tables, 1 ref. (Rept. no. 8926-050)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Resins, *Glass textiles, *Thermal insulation, Temperature, Honeycomb cores, Foams, Phenolic resins, Silicones, Elasticity, Coatings, Ceramic coatings, Aluminum alloys, Glass, Synthetic rubber, Erosion, Shear stresses, Mach number, Aerodynamic heating, Materials.

About 100 combinations of materials representing orderly arrays of hollow organic and inorganic spheres (syntactic foams), compressed glass fibers, phenolic honeycombs and silicone foams were screened to determine their resistance to impingement by Mach 2.5 and 3 air flows. The screening examined insulating properties, thermal properties, resistance to air erosion, resistance to cracking due to tension field wrinkling, surface smoothness, weight, water absorption, fuel and oil resistance, tear propagation resistance, low temperature strength, and elasticity. The arrays of hollow spheres were found subject to thermal cracking, and the thick, easily compressible silicone foams were found subject to excessive flutter. The remaining materials, compressed glass fibers and phenolic honeycombs, gave promise for development for insulative protection of aluminum alloy construction in Mach 2.5 and 3 air flows. (Author)

AD-290 661 Div. 14, 1
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
BRIGHTNESS RETENTION ON MATERIALS - FINISHES AND COATINGS - FLUORESCENT MARKING,
by L. A. Mappus, J. C. George, and E. E. Keller.
9 Jan 58, 11p. incl. tables, 1 ref. (Rept. no. 8926-051)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Finishes, *Coatings, *Fluorescence, Humidity, Visibility, Handling, Enamel coatings, Exposure, Brightness, Aircraft, Varnishes.

The visibility, as applied and after weatherometer and humidity exposures, of four orange-red fluorescent coating materials was evaluated. In addition, the ability of two clear top coating materials to reinforce the durability of the orange-red fluorescent coatings was evaluated. The relative visibility of all four materials, when applied over white lacquer and white enamel, was equivalent immediately after application. (Author)

AD-290 662 Div. 14, 12
(TISTM/TCG) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
ROCKET BLAST IMPINGEMENT RESISTANCE ON MATERIALS - FINISHES AND COATINGS - FLAME SPRAYED ALUMINA - ZIRCONIA - TUNGSTEN CARBIDE,
by J. E. Shoffner, E. E. Keller, and W. M. Sutherland. 29 Jan 58, 15p. incl. illus. tables, 3 refs. (Rept. no. 8926-060)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Finishes, *Coatings, *Ceramic materials, Aluminum compounds, Zirconium compounds, Oxides, Tungsten compounds, Carbides, Nickel alloys, Molybdenum, Crazing, Microstructure, Crystal structure, Tensile properties, Moisture, Storage, Particles, Ablation, Exhaust gases, Rocket motors, Physical properties, Flame spraying, Erosion.

Inconel-X and Mo (pure) substrates were coated with 0.025, 0.050 and 0.075 in. thicknesses of Al2O3, ZrO2 and WC. Generalized conclusions resulted from rocket blast impingement using gas velocities of 8000 ft/sec, impingement distances of 5.1 and 12.7 nozzle diameters (1.18 in. exit diameter), and 3000 to 4000 F temperatures. In these tests the resistance of ZrO2 and Al2O3 to erosion and ablation appeared equal for similar thicknesses and temperatures, but the ZrO2 0.075 in. thick coatings displayed the greater tendency to chip and fail under these conditions. The ZrO2 coatings exhibited hairline crazing at 3700 to 4000 F, and the Al2O3 tended to flow at these temperatures. ZrO2 did not perform satisfactorily on Mo and the performance of Al2O3 was not given in Mo terms. (Author)

AD-290 693 Div. 14
(TISTM/TCG) OTS price $3.60

Miami U., Coral Gables, Fla.
(No title).
Final technical rept. for Nov 62,
by Karl S. Vorres, Nov 62, 1v. incl. tables, refs.
(AFOSR Grant 61-104)
Unclassified report

DESCRIPTORS: *Refractory materials, *Oxides, *Zirconium compounds, *Calcium compounds, Fluorides, Crystal structure, Dioxides, Phase studies, Solids, Solutions, Rare earth elements, Metals, Lattices, Ions, Valence, Complex compounds, Molecular structure, Copper compounds, Sintering, Heating, Chemical reaction, Preparation.

The conditions for the appearance of the fluorite-type solid solution with ZrO2 have been investigated experimentally by studying sub-solidus equilibria in the binary systems composed of ZrO2 and each of CuO, Cu2O, SnO2, Ag2O, Tl2O, CdO, and Ga2O3. No solid-solution formation was observed. The data was correlated with all other data on binary systems with ZrO2 to determine conditions for the appearance of the fluorite phase. A plot of ionic radius versus electronegativity most effectively demonstrated that the conditions are (1) the added oxide must have a cation radius larger than that of tetravalent Zr to be stable down to room temperature and (2) the added oxide must be somewhat more electropositive than the Zr. This then produces a more nearly ionic lattice for which the fluorite structure would be expected. Furthermore, the added oxide must be di or trivalent. Random cation placement occurs with divalent cations and ordering is obtained with the trivalent ones. The CaF2-rare earth oxide systems in a laboratory atmosphere were studied, and ABO4 type structures were correlated. (Author)

AD-290 709 Div. 14, 26
(TISTM/RGR) OTS price $4.60

Forest Products Lab., Madison, Wis.
BARK-PEELING MACHINES AND METHODS.
Jan 49, rev. Aug 62, 1v. incl. illus. tables, refs. (Rept. no. 1730 (rev.))
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Trees, *Machines, Wood, Bibliography, Wood pulp machines, Operation, Processing.

Methods of removing bark, factors affecting bark removal, and principles of machine operations are discussed and illustrated. Performance data of peeling equipment by product and machine type are tabulated. (Author)

AD-290 710 Div. 14, 26
(TISTM/RGR) OTS price $1.60

Forest Products Lab., Madison, Wis.
A MATHEMATICAL ANALYSIS OF THE EFFECT OF KERF WIDTH ON LUMBER YIELD FROM SMALL LOGS,
by Hiram Hallock. Nov 62, 22p. incl. illus. tables (Rept. no. 2254)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Trees, *Sawmills, Mathematical analysis, Wood, Production, Processing.

Increased lumber yield through decreased kerf can occur in at least three ways: through increased length of waney jacket boards; through increased width of jacket boards; and through recovery of an additional board otherwise left in the slabs because it is less than minimum width. Increased yield ranging from 0 to 33% and averaging slightly over 7% can be expected when logs in this diameter range are sawn with a 9/32-inch kerf rather than a 12/32-inch kerf. Also, the feasibility of segregating logs by diameter according to lumber items prior to sawing is strongly indicated. In certain diameter ranges, such segregation was found to increase recovery in terms of board feet up to 15%. (Author)

AD-290 711 Div. 14, 25
(TISTM/EJH) OTS price $1.10

Forest Products Lab., Madison, Wis.
PLASTIC BENDING OF WOOD BEAMS,
by Charles B. Norris. Nov 62, 5p. 12 refs.
(Rept. no. 2255)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at the Symposium on Timber--A Tested Material for the Engineer, held at the Fourth Pacific Area National Meeting, American Society for Testing and Materials, October 3, 1962, at Los Angeles, Calif.

DESCRIPTORS: *Wood, *Deformation, *Beams, Stresses, Elasticity, Plasticity, Mechanical properties, Failure (Mechanical), Design, Theory.

It would seem that the linear distribution of strain in a beam and the elastic-plastic nature of wood subjected to compression parallel to the grain are very well established and should be considered in investigations of and in the design of wood beams. The methods referred to in this paper apply to beams made of straight-grained clear wood. In such beams the tensile strength is greater than the compressive strength so that usually the plastic region is well developed before failure takes place. If the tensile strength is reduced by the presence of defects to a value less than the compressive strength, no plastic region will be developed and the formulas given will not apply. If this occurs, the usual elementary engineering formula using the reduced tensile strength for the modulus gives a good estimate of the bending strength. (Author)

AD-290 712 Div. 14, 30
(TISTM/EJH) OTS price $1.60

Forest Products Lab., Madison, Wis.
ELECTRON MICROSCOPE EXPANDS HORIZONS IN WOOD RESEARCH,
by Irving B. Sachs. Nov 62, 10p. incl. illus.
(Rept. no. 2256)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at the Symposium on Timber--A Tested Material for the Engineer, held at the Fourth Pacific Area National Meeting, American Society for Testing and Materials, October 3, 1962, at Los Angeles, Calif.

DESCRIPTORS: *Wood, *Electron microscopy, Structures, Preservation, Impregnation, Deterioration, Lignin, Test methods.

AD-290 714 Div. 14, 30
(TISTM/BRW) OTS price $1.60

Forest Products Lab., Madison, Wis.
TEST FOR QUALITY OF GLUE BONDS IN END-JOINTED LUMBER,
by M. L. Selbo. Nov 62, 16p. incl. illus. tables (Rept. no. 2258)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at Symposium on Timber--A Tested Material for the Engineer, Fourth Pacific Area National Meeting, American Society for Testing and Materials, October 3, 1962, in Los Angeles, Calif.

DESCRIPTORS: *Wood, *Bonded joints, Bonding, Test methods, Quality control, Tensile properties.

Development of a tension test suitable for quality control on finger joints and other end joints in wood is described. The specimen used is rectangular and can be prepared rapidly with a planer-type table saw. The approximate size of the specimen is 3/32 by 3/4 inch in cross section by 10 inches in length. Because the specimen is simply prepared and can be tested quickly on a universal testing machine, it is also well suited as a screening tool in research and development on end joints in wood. (Author)

AD-290 715 Div. 14, 26
(TISTM/RGR) OTS price $2.60

Forest Products Lab., Madison, Wis.
CYLINDRICAL SHEAR SPECIMEN FOR QUALITY CONTROL TEST ON GLUE BONDS IN LAMINATED TIMBERS,
by M. L. Selbo. Nov 62, 20p. incl. illus. tables (Rept. no. 2259)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at the Symposium on Timber--A Tested Material for the Engineer, Fourth Pacific Area National Meeting, American Society for Testing and Materials, October 3, 1962, at Los Angeles, Calif.

DESCRIPTORS: *Wood, *Bonded joints, *Beams, Adhesives, Test methods, Test equipment, Shear stresses, Quality control.

The quality of the glue joints in laminated beams was evaluated by removing round plugs (with their axes perpendicular to the glue lines) from noncritical areas of the beams and testing them in shear. A standard block shear tool was modified to facilitate testing glue joints in round plugs. (Author)

AD-290 716 Div. 14, 26, 30
(TISTM/EJH) OTS price $1.60

Forest Products Lab., Madison, Wis.
PRESENT STATUS OF RESULTS-TYPE SPECIFICATIONS FOR TREATED WOOD,
by R. H. Baechler. Nov 62, 16p. incl. illus. table, refs. (Rept. no. 2260)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at the Symposium on Timber--A Tested Material for the Engineer, held at the Fourth Pacific Area National Meeting of the American Society for Testing and Materials, Oct. 3, 1962, Los Angeles, Calif.

DESCRIPTORS: *Wood, *Antifouling coatings, *Telephone poles, Processing, Preservation, Deterioration, Coatings, Test methods, Reliability, Specifications, Creosote, Phenols.

AD-290 717 Div. 14
(TISTM/ODN) OTS price $1.60

Forest Products Lab., Madison, Wis.
DETERMINATION OF HAZE AND INSOLUBLE RESIDUE AFTER ACETYLATION OF WOODPULP,
by F. A. Simmonds. Nov 62, 7p. tables, 8 refs. (Rept. no. 2261)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Wood pulp, Haze, Acetylation, Acetic acids, Acetic anhydrides, Sulfuric acid, Acetates, Light, Scattering, Cellulose, Determination.

A convenient and rapid procedure is described for determining the haze-forming tendency of woodpulp after acetylation and the amount of insoluble residue in the acetate solution. The method prescribes (1) a pretreatment that involves steeping the sample in water if it is air-dry, followed by steeping it in 85% acetic acid at room temperature, (2) displacement of the dilute acetic acid with glacial acetic acid, (3) acetylation with a mixture of glacial acetic acid, acetic anhydride, and sulfuric acid catalyst, and (4) measurement of haze and insoluble residue in the acetate solution before and after centrifuging. Approximately 5 hours are required for acetylation and measurement of haze. For a commercial softwood sulfite pulp of acetylating grade, the initial haze was 1.6 to 3.0% and the insoluble residue was 0.13 to 0.32%; after centrifuging, the haze was 1.6 to 2.0%. (Author)

AD-290 744 Div. 14, 25
(TISTM/TCG) OTS price $2.60

Quartermaster Research and Engineering Command, Natick, Mass.
THE THERMAL CONDUCTIVITY OF A MULTILAYER SAMPLE OF UNDERWATER MATERIAL UNDER A VARIETY OF EXPERIMENTAL CONDITIONS,
by George F. Fonseca and Harold J. Hoge. Oct 62, 19p. incl. illus. tables, 6 refs. (Technical rept. PR-8)
Unclassified report

DESCRIPTORS: *Underwear, *Clothing, *Cotton, *Woolen textiles, Thermal conductivity, Thermal insulation, Heat transfer, Temperature, Pressure, Water, Adsorption, Density, Textiles, Controlled atmosphere, Air, Helium, Fluorochlorides.

Results of measurements of the thermal conductivity of a sample of twelve layers of standard underwear material (50% wool, 50% cotton) are presented. Temperature was varied from about 65 to about 135 F, pressure (air) was varied from less than 0.1 mm Hg to atmospheric, and sample density was varied from about 14 to about 20 lb per cubic foot. Some measurements were made with the air removed from the sample chamber and water introduced. Measurements were made in which the air in the sample chamber was replaced by He, or by Freon-12 (CC12F2). (Author)

AD-290 812 Div. 14, 17, 25
(TISTM/ODN) OTS price $2.25

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THE VAPORIZATION AND PHYSICAL PROPERTIES OF CERTAIN REFRACTORIES. PART II. EXPERIMENTAL STUDIES. Final rept., 1 June 60-31 May 61 on Material Thermal Properties,
by A. A. Hasapis, A. J. Melveger and others.
Oct 62, 85p. incl. illus. tables, 39 refs.
(Contract AF 33(616)6840, Projs. 4776 and 7360)
(WADD TR 60-463, pt. 2) Unclassified report

DESCRIPTORS: *Refractory materials, *Vaporization, Iridium, Rhodium, Ruthenium, Carbon, Oxides, Aluminum compounds, Thorium compounds, Hafnium compounds, Thermodynamics, Rare earth elements, Silicides, Molybdenum compounds, Tungsten compounds, Cobalt compounds, Uranium, Surface tension, Zirconium, Mass spectroscopy, Viscosity, Vanadium compounds, Phase studies, Vapor pressure, Physical properties.

Vapor pressure-temperature relationships for Ir, Rh, Ru, Ir plus C, alumina, thoria, and hafnia were studied by simple effusion and mass spectrometric methods. Vapor phase species were identified. Vapor pressure data and derived heats of vaporization and reaction are presented. The

vaporization modes of the rare earth sesquioxides were studied mass spectroscopically. Data demonstrate that the mode of vaporization of these materials is strongly dependent upon the number of electrons in the 4f shell of the rare earth metal. Continuously monitored effusion experiments conducted on the Mo-Si system yielded heats of dissociation. Continuously monitored experiments on the W-Si system yielded approximate dissociation pressures. The surface tensions of silica and silica plus 1% oxide additives and Zr plus U, pure silica, silica plus 1% V2O5, silica plus 1% CoO and silica plus 1% Al2O3 were determined. (Author)

AD-290 823 Div. 14
(TISTM/BRW) OTS price $26.00

American Machine and Foundry Co., Alexandria, Va.
A USER-ORIENTED DATA GUIDE TO POTTING AND ENCAPSULATING COMPOUNDS.
Rept. for June 60-June 61,
by Edward V. O. Drinkard and Eugene E. Snyder.
June 61, 503p. incl. illus. refs.
(Contract AF 33(616)7408, Proj. 0(7-7381))
(ASD TR 61-297) Unclassified report

DESCRIPTORS: *Electric insulation, *Materials, Data, Polymers, Handling, Storage, Hazards, Mechanical properties, Chemical properties, Electrical properties, Handbooks, Epoxides, Epoxy resins, Esters, Urethanes, Silicone resins, Varnishes, Ceramic materials, Encapsulation.

This publication is a data guide to potting and encapsulating materials. The important properties of currently available compounds are listed on standard format sheets. Materials covered include epoxies, polyesters, polyurethanes, polysulfides, polystyrenes, silicones, and ceramics. Also included are related varnishes, copolymers, and miscellaneous potting and encapsulating materials. Detailed information is presented on the general characteristics, applications, chemical resistance, fillers, curing, and formulations. In addition, graphs and cross-reference charts are included to assist the user in locating any desired fragment of information. (Author)

AD-290 934 Div. 14, 25
(TISTP/WH) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EFFECTS OF HIGH-RATE COMPRESSION LOADING ON SHORT REINFORCED PLASTIC MEMBERS.
Progress rept.,
by Adolph E. Slobodzinski and Mitchel Chmura.
Nov 62, 28p. incl. illus. tables (Picatinny Arsenal technical rept. no. 3043)
(DA Proj. 593-32-008)
Unclassified report

DESCRIPTORS: *Plastics, *Beams, *Loading, *Instrumentation, *Test equipment, Aluminum, Cellulose acetate, Epoxides, Reinforcing materials, Construction, Load distribution, Structures.

The behavior of structural plastic components when they are loaded rapidly in compression is investigated. The specific objective of the phase of the work described in this report is to redesign and improve the present high-rate compression tester. The test pieces used were of three types: short, thin-walled tubular aluminum columns, solid columns of cellular cellulose acetate, and tubular epoxy columns. Permanent deformations of both the tubular aluminum columns and the solid cellular cellulose acetate columns appeared to occur intermittently as the columns resisted series of maximum loads as deformations progressed. The intervals between the points of maximum resistance were relatively uniform for the aluminum columns, but were varied for the cellular cellulose acetate test pieces. The epoxy columns gave the least reproducibility, shattering severely under load. It was concluded that the present construction of the compression tester requires major modifications. Terminal conditions cannot be controlled. It was established that an optical system to simultaneously record deformations along successive increments of length of columns during testing should be integrated into the test system. (Author)

AD-291 049 Div. 14, 7, 5, 31
(TISTM/EJH) OTS price $1.60

Naval Underwater Ordnance Station, Newport, R. I.
A SAMPLE TEST EXPOSURE TO EXAMINE CORROSION AND FOULING OF EQUIPMENT INSTALLED IN THE DEEP OCEAN,
by J. Milligan. Nov 62, 7p. incl. illus. 2 refs.
(Technical memo. no. 291)
Unclassified report

DESCRIPTORS: *Electric cables, *Plastic coatings, *Insulating materials, *Underwater sound equipment, Underwater, Polymers, Ethylenes, Propenes, Wire, Steel, Aluminum alloys, Nymon rope, Fouling, Corrosion, Deterioration, Test methods, Materials.

Components of sound monitoring systems are continuing to be exposed in TOTO (Tongue of the Ocean, Bahamas), to accumulate knowledge on the effects of deep sea environment. On 25 July 1962, samples were retrieved which had been exposed since 5 April 1962 at a depth of approximately 5100 ft. The samples consisted of: (1) a panel of plexiglas on which were mounted six cable samples and a moed piece of polyurethane rubber; (2) polyethylene-jacketed steel wire rope; (3) a coated steel panel; and (4) two panels of molded phenolic board containing a number of stressed and unstressed aluminum samples. Upon retrieval, there were no signs of fouling or of marine borer action in any of the samples. Certain alloys of the aluminum samples showed considerable corrosion. Small blisters were apparent in localized areas of the coated low carbon steel panel, although extensive corrosion had not taken place. Conductor cables, except for the sample prepared without the outer covering of jute, were not corroded. None of the plastic jackets of the conductor cable samples were cracked, although the polyethylene jacket of the anchor strength wire rope sample did show splitting in several places. (Author)

AD-291 052 Div. 14, 17
(TISTM/ODN) OTS price $.75

Rock Island Arsenal Lab., Ill.
WEAR AND CORROSION TENDENCIES OF MOLYBDENUM DISULFIDE CONTAINING GREASES,
by S. Fred Calhoun. 15 Aug 62, 21p. incl. illus. tables, 19 refs. (Rept. no. 62-2752)
(Proj. 593-21-060)
Unclassified report

DESCRIPTORS: *Lubricant additives, *Lubricants, *Molybdenum compounds, *Sulfides, *Corrosion, Metals, Pressure, Loading, Metallic soaps, Lithium, Barium, Sea water, Sprays, Corrosion inhibition, Temperature, Friction, Greases.

The tendency of MoS2 to increase the wear of greases is shown by results of laboratory tests made at Rock Island Arsenal. The extreme pressure properties of greases were increased by the addition of the MoS2. Both statements are supported by the literature. MoS2 was shown to

promote rusting of ferrous metals when added to grease. Literature references show that it also promotes corrosion of other metals. Laboratory data and photographs are used to support the conclusions which were made. (Author)

AD-291 166 Div. 14, 25
(TISTM/ODN) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
MATERIALS AND STRUCTURES EVALUATION PROGRAM. INVESTIGATION OF THE FREE VIBRATIONS OF MULTI-LAYERED CYLINDRICAL SHELLS.
Semiannual technical rept., 1 Jan-30 June 62, by V. I. Weingarten. 11 Sep 62, 22p. incl. illus. 12 refs. (Rept. no. TDR-69(2240-65)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-182) Unclassified report

DESCRIPTORS: *Cylindrical bodies, Vibration, Theory, Mathematical analysis, Moments, Laminates, Elasticity, Tests, Steel, Frequency, Oscilloscopes.

Major emphasis was placed on structures studies. Breathing-mode vibrations of multi-layered cylindrical shells were investigated. A simple formula was developed for determining equivalent cylinder parameters for isotropic multi-layered shells with each layer having the same Poisson's ratio. These equivalent cylinder parameters can be used in conjunction with available frequency equations for monocoque cylinders. (Author)

AD-291 181 Div. 14, 1
(TISTM/ODN) OTS price $4.60

Ethyl Corp., Detroit, Mich.
DEVELOPMENT OF CLR ENGINE TEST FOR RATING AIRCRAFT ENGINE OILS.
Report on Phase I of a Test Program, by J. B. Retzloff. Sep 60, 33p. illus. (Rept. no. GR 60-5)
(Contract NOw 60-0311-c)
Unclassified report

DESCRIPTORS: *Lubricants, *Airplane engine oils, Airplane engines, Tests, Fuels, Piston rings, Specifications, Test equipment, Pistons, Viscosity, Physical properties, Lubricant additives, Deposits, Lubrication, High temperature research, Oils.

A 40-hour, single-cylinder engine test procedure was developed which reproducibly discriminates between AEL-0-64 and AEL-0-66 Navy reference oils in regard to piston cleanliness and used-oil properties. The separation was achieved by operating a CLR oil test engine at a cylinder liner temperature of 375 F and an oil gallery temperature of 225 F. (Author)

AD-291 188 Div. 14, 25
(TISTM/ODN) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
THERMODYNAMIC AND MECHANICAL MEASUREMENTS ON RUBBER I. METHODS AND PRELIMINARY RESULTS, by Daniel Caulfield and Brita Immergut. Oct 62, 19p. incl. illus. table, 3 refs. (PIBAL rept. no. 661)
(Contract Nonr-83932, Proj. NR 064-457)
Unclassified report

DESCRIPTORS: *Rubber, *Thermodynamics, Mechanical properties, Structures, Measurement, X rays, Test equipment, Synthetic rubber, Elasticity, Deformation, Tensile properties, Peroxides, Stresses, Polymers.

Preliminary investigations into the mechanical behavior and thermodynamic and structural properties of rubbers are reported. An apparatus for obtaining significant thermodynamic quantities is described along with some initial results. Mechanical and X-ray measurements were made to provide correlations among thermodynamic, structural and mechanical properties. (Author)

15. MATHEMATICS

AD-289 852 Div. 15
(TISTP/WH) OTS price $1.10

RAND Corp., Santa Monica, Calif.
A NOTE ON ASYMPTOTIC BEHAVIOR OF DIFFERENTIAL EQUATIONS,
by Richard Bellman. Nov 62, 5p. 2 refs. (Memo. no. RM-3396-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Differential equations, *Inequalities.

The asymptotic behavior of solutions of the equations $u'' - (1 + f(t))u = 0$ has been extensively investigated. It is of interest, however, to present a new method which is quite easy to apply and which seems capable of yielding a number of useful results. (Author)

AD-290 092 Div. 15
(TISTB/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
ON RELIABILITY INFERIRCE,
by Edward L. Pugh. 5 Nov 62, 15p. 14 refs.
(Rept. no. SP-935/000/01)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Statistical functions, Functions, Probability, Theory, Reliability.

It is stated that reliability theory consists of two main areas of study: modeling and inference. Inference has centered mainly around the exponential distribution and life test acceptance based on this distribution. Inferences of a more direct type than an acceptance rejection procedure are discussed: a best point estimate of the reliability and a confidence relation. This report supersedes SP-935. (Author)

AD-290 241 Div. 15
(TISTP/JW) OTS price $1.60

Theoretical Chemistry Lab., U. of Wisconsin, Madison.
QUANTUM MECHANICAL SOLUTIONS OBTAINED BY TRUNCATED REACTION OPERATORS,
by William J. Meath, S. Osvaldo Goscinski and others. 21 Nov 62, 10p. (Rept. no. WIS-TCI-5, Series 3)
(Contracts AF 33(657)7311, NOrd-15884 and Grant NsG-275-62(4180))
Unclassified report

DESCRIPTORS: *Functions, *Quantum mechanics, Matrix algebra, Perturbation theory, Operators (Mathematics), Linear systems, Wave characteristics.

The use of truncated basis sets comprised of eigenfunctions of an unperturbed Hamiltonian is discussed as a practical method for obtaining an approximate solution for the reaction operator

equation, and an approximate wave function for the perturbed system. The solution employs an iterative method which yields the matrix elements of the reaction operator. Connections between this approximate solution of the reaction operator equation and the linear variational, the Brillouin-Wigner and the Feenberg methods are derived. (Author)

AD-290 322 Div. 15
(TISTP/MAK) OTS price $4.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
A PRIORI BOUNDS ON THE DISCRETIZATION ERROR IN THE NUMERICAL SOLUTION OF THE DIRICHLET PROBLEM,
by J. H. Bramble and B. E. Hubbard. Aug 62, 39p. 19 refs. (Technical note BN-296)
(Contract AF 49(638)228)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Numerical methods and procedures, Green's function, Convex sets.

Explicit a priori bounds are obtained on the discretization error for a certain finite difference analogue of the Dirichlet problem for Poisson's equation. The bounds involve square integrals of various derivatives of the data (including the curvature of the boundary which is considered as data). They exhibit O (h-square) asymptotic behavior where h is the mesh constant associated with a square grid. (Author)

AD-290 324 Div. 15
(TISTP/MAK) OTS price $3.60

Research Triangle Inst., Durham, N. C.
STUDY OF FAILURE RATE DISTRIBUTIONS OF SERIES-PARALLEL CONFIGURATIONS.
Quarterly progress rept. no. 1, 1 July-30 Sep 62,
by J. B. Tommerdahl and A. C. Nelson. 30 Sep 62, 36p. incl. illus. 4 refs.
(Contract DA 36-039-sc-90822, Proj. 3X90-90-004)
Unclassified report

DESCRIPTORS: *Reliability, *Applied mathematics, *Electrical equipment, *Electronic equipment, Probability, Statistical analysis, Electrical networks, Electronic circuits, Electronic systems.

The primary purpose of this project is to conduct an investigation of a technique for predicting the reliability of electronic circuits, the component parameters of which are effectively in series-parallel configurations. The reliability prediction will be based on the distributions of the component part parameters and a mathematical equation which relates the circuit attributes to the component part parameters. A method for empirically developing the mathematical relationship is an integral part of this investigation. Compilation of a selected bibliography and the initial steps in the empirical model building phase have been taken; this includes tentative component selection. This report covers the first quarter of a one-year program. (Author)

AD-290 524 Div. 15, 2
(TISTP/TL) OTS price $1.10

Brown U., Providence, R. I.
EXTENSIONS TO THEORY OF TIME SERIES ANALYSIS.
Quarterly rept. no. 1, 1 Aug-31 Oct 62,
by Walter Freiberger. 31 Oct 62, 2p.
(Contract DA 36-039-sc-87222, Proj. 3A99-25-002; Continuation of Contract DA 36-039-sc-78130)
Unclassified report

DESCRIPTORS: *Probability, *Statistical processes, *Numerical analysis, *Series, *Statistical analysis, *Weather forecasting, Mathematical prediction, Differential equations, Meteorology.

In the previous contract, work fell roughly under the following headings: (1) Regression analysis for time series: (a) Scalar valued random processes; (b) Vector valued random processes; (2) Spectral analysis for time series: (a) Scalar valued random processes; (b) Vector valued random processes; (c) Random processes with several independent variables. In the current contract, the emphasis will be on topic 2(c) and on applications to the geophysical sciences, particularly meteorology. (Author)

AD-290 533 Div. 15
(TISTP/MAK) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
A GEOMETRICAL PROOF OF A THEOREM DUE TO D. SLEPIAN,
by B. A. Chartres. Aug 62, 13p. incl. illus. 2 refs. (Technical rept. no. 1)
(Contract DA 36-039-sc-87222)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Statistical processes, Geometry.

This note uses a factorization of covariance matrices technique which allows the author to reduce an n-dimensional problem to one in two dimensions and thus extend a theorem dealing with the theory of one-sided Gaussian noise barriers.

AD-290 541 Div. 15
(TISTP/MAK) OTS price $1.60

Institute of Mathematical Sciences, New York U., N. Y.
A LOCALLY MOST POWERFUL RANK TEST FOR THE LOCATION PARAMETER OF A DOUBLE EXPONENTIAL DISTRIBUTION,
by Eugene Laska. Oct 62, 11p. (Rept. no. IMM-NYU 304)
(Contract Nonr-28538)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Statistical tests, Statistical distributions, Statistical functions.

The locally most powerful rank test (L.M.P.R.T.) for the location parameter of the two sided exponential cumulative density function is examined. Comparing this test with the likelihood ratio test and making use of Pittman's definition of asymptotic relative efficiency (A.R.E.) we find that Birnbaum's test is asymptotically efficient. The A.R.E. of the latter to the likelihood ratio test is one for symmetric distribution and otherwise is shown to vary between zero and infinity. (Author)

AD-290 682 Div. 15
(TISTP/MAK) OTS price $8.10

Massachusetts Inst. of Tech., Cambridge.
CONSTRUCTIVE VERSIONS OF ORDINAL NUMBER CLASSES,
by Donald L. Kreider and Hartley Rogers, Jr. 1960, 84p.
(Contract AF 49(638)76)
Unclassified report

DESCRIPTORS: *Number theory, *Algebra, *Groups (Mathematics).

In article 1 we give certain terminology and background related to the classical theory of

ordinals. In article 2 we discuss S1, S3 and the general notion of system of notations. In article 3 we discuss certain peculiarities of the Addison-Kleene extension of S3. In article 4 we extend S1. In article 5 we extend S3 (in continuation of the Addison-Kleene extension). In article 6 we show that the system of article 4 is in both two-function-quantifier forms. In article 7 we use this result to show that iteration of the hyperjump over the extension of S1 does not lead beyond sets in both two-function--quantifier forms. In article 8 we obtain the results of article 6-7 for the extension of S3. In article 9 we raise certain open questions and discuss possible directions for further research. (Author)

AD-290 687 Div. 15, 25
(TISTP/MAK) OTS price $3.60

Torino U. (Italy).
ON THE GREEN'S FUNCTION OF POTENTIAL SCATTERING. Final technical rept.,
by Mario Verde. 29 Sep 62, 36p.
(Contract AF 61(052)230)
Unclassified report

DESCRIPTORS: *Green's function, *Wave transmission, *Elastic scattering, *Diffraction, Complex variables, Bessel functions, Equations, Functional analysis, Functions, Integration, Operators (Mathematics), Potential theory, Special functions.

The Green's function in some potential scattering problems of spherical symmetry is written as an integral of the product of the Green's function Ga corresponding to the angular variables and Gr corresponding to the radial variables. The integration is carried along a suitable line C in the plane of complex angular momentum. If C surrounds the spectrum of Ga the usual partial waves expansion is obtained, if C surrounds the spectrum of Gr a different expansion results which is the most suitable for describing collisions involving small wave lengths. (Author)

AD-290 741 Div. 15, 8
(TISTP/MAK) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
METHODS FOR THE ADAPTIVE OPTIMIZATION OF BINARY DETECTION SYSTEMS,
by Harold J. Kushner. 9 Nov 62, 57p. incl. illus. 7 refs. (Rept. no. 22G-2)
(Contract AF 19(628)500)
(AFESD TDR 62-234) Unclassified report

DESCRIPTORS: *Detectors, *Radiofrequency filters, *Statistical analysis, *Signal-to-noise ratio, Statistical tests, Perturbation theory.

Adaptive techniques are considered for the experimental optimization of binary detectors which operate in a partially unknown environment. The purpose of the detectors is to determine whether a fixed signal is present. The following situations are considered: (1) unknown discrete signal and known noise correlation; (2) unknown noise correlation and known discrete signal; (3) the continuous versions of (1) and (2); and (4) a signal optimization problem with unknown noise correlation. (Author)

AD-290 742 Div. 15, 20
(TISTP/MAK) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
MOLECULAR ORBITALS FOR H2 BASED ON CENTRAL POTENTIALS AVERAGE HAMILTONIAN AND CORRELATION ENERGY,
by James M. Peek and Edwin N. Lassettre.
Sep 62, 27p. incl. illus. tables, 8 refs.
(Scientific rept. no. 1)
(Contract AF 19(604)4541, Proj. 7635)
(AFCRL 62-1041) Unclassified report

DESCRIPTORS: *Atomic orbitals, *Quantum mechanics, *Potential theory, *Hydrogen, Operators (Mathematics), Green's function, Statistical functions, Electrons.

This paper obtains a formula for the difference between the mean molecular energy of homonuclear diatomic hydrogen and a molecular energy equation used by the authors in J. Chem. Phys. 33, 1803 (1960). The difference is shown to be the sum of a potential energy term and a kinetic energy term when a correlation function is used to modify the mean energy. The error introduced by an approximate formula for the repulsion between the two electrons is examined. Experimental analysis shows that the original model is much more accurate near the equilibrium internuclear distance than was originally expected.

AD-290 746 Div. 15
(TISTP/MAK) OTS price $8.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
PROBABILITY INTEGRALS OF MULTIVARIATE NORMAL AND MULTIVARIATE t,
by Shanti S. Gupta. 18 Sep 62, 95p. incl. tables, 189 refs. (Technical rept. no. 64)
(Contract Nonr-22553, Proj. NR 042-002)
Unclassified report

DESCRIPTORS: *Probability, *Statistical distributions, *Tables, *Bibliography.

This paper gives a survey of the work on multivariate probability integral and related functions starting with the bivariate case and includes the author's recent work on the probability integrals of the multivariate normal and a multivariate analogue of Student's t. An annotated bibliography on evaluation of multivariate normal and t probability integrals (189 entries) is included. (Author)

AD-290 801 Div. 15, 8
(TISTP/TL) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DESCENDANT THEOREM IN ABELIAN GROUPS,
by Stephen S. Shatz. 16 Nov 62, 8p. 3 refs.
(Rept. no. 52G-5)
(Contract AF 19(628)500)
(AFESD TDR 62-239) Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Communication theory, *Coding, *Matrix algebra.

AD-291 055 Div. 15
(TISTP/MAK) OTS price $2.60

George Washington U., Washington, D. C.
AN ALGORITHM FOR APPROXIMATELY INVERTING LARGE MATRICES WITH DOMINANT DIAGONAL,
by Martin Hershkowitz and Stedman B. Noble.
6 Dec 62, 23p. incl. tables, 17 refs. (Serial no. T-151)
(Contracts Nonr-76103, Nonr-76105 and Nonr-76106, Proj. nos. NR 347 107, NR 047 001 and NR 347 008)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Numerical methods and procedures, *Computer logic.

This presentation gives an algorithm that determines the structure of a matrix while inverting it. The algorithm applies to matrices with dominant diagonal or similar matrices that can be inverted using the C. Neumann series. This series is decomposed into terms which are products of connected coefficients: the procedure lends itself to an efficient method of truncation that obtains an approximation to the inverse matrix. Furthermore, the computation enumerates the connections in the matrix; hence the model can be 'tested' by comparing the connections of the model with those known to exist in the underlying phenomena. (Author)

AD-291 090 Div. 15
(TISTP/MAK) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
LECTURES ON THE THEORY OF SPHERICAL HARMONICS,
by Claus Muller. Oct 62, 49p. 5 refs.
(Document no. D1-82-0209; Mathematical note no. 276)
Unclassified report

Also available from the author.

DESCRIPTORS: *Harmonic analysis, *Trigonometry, *Mathematics, Complex variables, Partial differential equations, Polynomials, Special functions, Operators, Transformations (Mathematics), Spherical.

The subject of these lectures is the theory of spherical harmonics in any number of dimensions. The approach is such that the two- or three-dimensional problems do not stand out separately. They are on the contrary regarded as special cases of a more general structure. It seems that in this way it is possible to get a better understanding of the basic properties of these functions, which thus appear as extensions of well-known properties of elementary functions. One outstanding result is a proof of the addition theorem of spherical harmonics, which goes back to G. Herglotz. The intent of these lectures is to derive as many results as possible solely from the symmetry of the sphere, and to prove the basic properties which are, besides the addition theorem, the representation by a generating function, and the completeness of the entire system. (Author)

AD-291 163 Div. 15, 3
(TISTB/SAT) OTS price $1.60

Operations Research Group, Army Chemical Center, Md.
GENERALIZATION OF PARTIAL DOSAGE-AREA CURVES FROM AN INSTANTANEOUS POINT SOURCE AT GROUND LEVEL,
by George H. Milly, Richard E. Heitman, and Donald F. Molino. May 62, 17p. incl. illus. table, 1 ref. (Operations Research Group note no. 11)
Unclassified report

DESCRIPTORS: *Dosage, Meteorological data, Temperature, Wind, Clouds, Distribution, Mathematical analysis, Measurement.

A method is derived for presenting the partial dosage-area equation in the form of generalized curves. A transposition of variables is introduced which permits the construction of generalized dosage-area distributions. From equations in terms of these transformed variables specific values of dosage and area can be derived. All parameters except temperature gradient (stability), are reflected in the transformed variables. Consequently, a separate curve is plotted for each value of this parameter. (Author)

16. MEDICAL SCIENCES

AD-289 618 Div. 16
(TISTB/MD) OTS price $1.10

Southwestern Medical School, U. of Texas, Dallas.
THE ABSORPTION OF FATTY ACIDS BY INTESTINAL PERFUSION IN SITU.
Rept. for 9 May 61-15 Mar 62 on Studies on Lipid Metabolism Using C14 Labeled Materials,
by James C. McPherson and William W. Burr, Jr.
15 Mar 62, 7p. incl. illus. 5 refs.
(Contract DA 49-007-md-662)
Unclassified report

DESCRIPTORS: *Fatty acids, *Intestine, Rats, Lipids, Absorption.

The absorption of lipids by the gastrointestinal tract has been studied by the classical techniques of fat balance studies, the Cori technique, thoracic duct cannulated animals, and histological sections. The in vitro techniques with inverted intestinal sacs and perfusion of isolated intestinal segments have been utilized recently. Some of the limitations and objections to both the previously employed in vitro and in vivo techniques can be overcome by the use of the in situ perfusion technique described by Jacobs and Luper for the study of carbohydrate absorption. Pivalic acid-1-C14 as a model substrate has been shown to be well absorbed by this technique. Preliminary studies in progress indicate absorption of a high molecular weight fatty acid (palmitic). (Author)

AD-289 811 Div. 16
(TISTM/ODN) OTS price $1.10

Naples U. (Italy).
(No title).
Final technical rept., 1 Sep 61-31 Aug 62.
31 Aug 62, 3p.
(Contract DA 91-591-EUC-1822)
Unclassified report

DESCRIPTORS: *Enzymes, *Coenzymes, Estrogens, Preparation, Italy, Cycloserine, Biochemistry, Glutamic acid, Phosphates.

AD-289 849 Div. 16, 28
(TISTB/MD) OTS price $2.60

Rome U. (Italy).
NEUROPHYSIOLOGICAL STUDIES OF BEHAVIOR (MODIFICATIONS OF CORTICAL EVOKED RESPONSES DURING AVOIDANCE CONDITIONING IN THE MONKEY),
by Gianfranco Ricci. 1 Mar 62, 27p. incl. illus. 27 refs.
(Contract AF 61(052)345)
Unclassified report

DESCRIPTORS: *Electroencephalography, Sound, Light, Electricity, Stimulation, Cerebral cortex, Primates, Conditioned reflex.

Experiments were carried out in order to investigate the modifications of the following cortical evoked responses during avoidance conditioning experiments as well as during spontaneous EEG arousel in the monkey: (1) cortical responses evoked by single electrical stimuli to specific thalamic nuclei in the sensory-motor, frontal and visual areas, (2) cortical responses evoked in the sensory-motor cortex by peripheral stimuli (single shocks to the hand), and (3) cortical responses evoked by repetitive thalamic stimulation (augmenting responses) to the specific thalamic nuclei in the sensory-motor and visual areas. (Author)

AD-289 889 Div. 16, 10
(TISTB/MD) OTS price $1.25

Callery Chemical Co., Pa.
RESEARCH ON TOXIC HAZARDS OF PENTABORANE.
Final rept., Dec 60-Dec 61 on Toxic Hazards of Propellants and Materials,
by George Roush, Jr., Bartis M. Kent, and Herbert A. Volz. Sep 62, 37p. incl. illus. tables, 11 refs.
(Contract AF 33(616)7728, Proj. 6302)
(AMRL TDR 62-109) Unclassified report

DESCRIPTORS: *Pentaboranes, *Diboranes, *Toxicity, Determination, Blood, Therapy, Safety, Protective clothing, Vertigo, Electroencephalography, Barbiturates, Muscle relaxants, Phenothiazine derivatives, Man, Boron compounds.

At a plant producing pentaborane, sixty workers were potentially exposed to the boranes. The purpose of this investigation was to measure these workers' exposure with the Blood Borane Test of Miller, to measure the contamination of the workers' environment, and to relate the data to observed biologic effects in the workers. The atmospheric monitoring revealed that the work area was usually not contaminated. Thirty-one cases of possible borane poisoning were seen. The Blood Borane Test was negative in each of these cases but these results may be due to the mild nature of the poisonings. The lung, liver, and kidney studies used revealed no abnormalities in these cases. A clinical evaluation on all of the exposed workers at the end of a year's production revealed no observable effects. The protective gear worn provided good, though not complete, protection. Further study of the hazards of the boranes will require a monitoring instrument of wider range of sensitivity to evaluate the acute poisonings and the protective gear worn. (Author)

AD-290 283 Div. 16, 28
(TISTB/MD) OTS price $2.60

Biotechnology Lab., U. of Calif., Los Angeles.
UPPER EXTREMITY PROSTHETICS RESEARCH. HUMAN TRACKING. CONTROL LOGIC FOR A MYOELECTRIC SERVO-BOOST SYSTEM. HUMAN THERMAL STUDIES.
Progress rept.,
by John Lyman. 15 Sep 62, 24p. 5 refs.
(Engineering Dept. rept. no. 62-57)
(Contracts V1005M-2075, N123(60530)23558A and AF 33(616)6763)
Unclassified report

DESCRIPTORS: *Scientific reports, *Artificial limbs, *Optical tracking, *Servomechanisms, *Heat tolerance, Biology, Control, Simulation, Space flight, Man.

AD-290 348 Div. 16, 28
(TISTB/MS) OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
MANIPULATION OF AROUSAL AND ITS EFFECTS ON HUMAN VESTIBULAR NYSTAGMUS INDUCED BY CALORIC IRRIGATION AND ANGULAR ACCELERATIONS,
by William E. Collins. Oct 62, 12p. incl. illus. tables, 37 refs. (Rept. no. 62-17)
Unclassified report

Presented at the annual meeting of the Aerospace Medical Association, Apr 9, 1962, Atlantic City, New Jersey.

DESCRIPTORS: *Eye, *Ear, Reaction (Psychology), Attention, Acceleration tolerance, Rotation, Stimulation.

Investigations concerned with the effects of subjective states on vestibular nystagmus were reviewed. Methods of controlling such states were discussed. Data indicate that the significant factor in subject-orientation is a state of arousal, defined in terms of mental activity. Continuous, concerted attending to a task yields a brisk, long-duration nystagmus. If responses to a task require less attention with repetition, or if subjects are not kept alert, a significant reduction in nystagmus output may occur. A sudden alerting stimulus may then occasion a burst of nystagmic activity in an apparently ''adapted'' individual. Knowledge of subjectives states is a prerequisite for proper evaluation of vestibular responses in theoretical formulations, in many clinical situations, and in ascertaining vestibular components associated with air- or space vehicle maneuvers. (Author)

AD-290 349 Div. 16
(TISTM/BRW) OTS price $1.25

Electric Boat Div., General Dynamics Corp., Groton, Conn.
RESEARCH AND DEVELOPMENT OF A LIQUID-GAS CONTACTOR FOR PHOTOSYNTHETIC GAS EXCHANGERS.
Final rept. on Space Biology Support,
by H. Wallman, J. L. Dodson and others. Sep 62, 37p. incl. illus. tables, 2 refs. (Rept. no. U413-62-108)
(Contract AF 33(616)8008, Proj. 7164)
(AMRL TDR 62-101) Unclassified report

DESCRIPTORS: *Photosynthesis, Gases, Liquids, Gas diffusion, Separation, Design, Centrifuge separation, Exchange reactions, Oxygen equipment.

A study was conducted to design, fabricate, and test a liquid-gas contactor and liquid-gas separator system capable of operation as a photosynthetic gas exchanger. The system is designed to handle the oxygen requirements of one man and to be capable of operation under weightless conditions. The gas exchange system consists of four major components: (1) a multi-pass light chamber, (2) an agitated liquid-gas contactor, (3) a centrifugal liquid-gas separator, and (4) an instrument console. It was demonstrated that this system has the capability of supporting one man under normal gravity and should be capable of operation under weightless conditions. (Author)

AD-290 500 Div. 16, 25
(TISTP/WH) OTS price $.75

Chicago U. Medical School, Ill.
INTERNAL BODY MOVEMENTS RESULTING FROM EXTERNALLY APPLIED SINUSOIDAL FORCES.
Rept. for Mar 60-Dec 61 on Biomechanics of Aerospace Operations,
by John L. Nickerson and Rolf R. Coermann. July 62, 16p. incl. illus. table, 14 refs.
(Contract AF 33(616)7053, Proj. 7231)
(AMRL TDR 62-81) Unclassified report

DESCRIPTORS: *Vibration, *Oscillation, *X-ray photography, *Body, Tissues (Biology), Stress (Physiology), Dogs, Resonance.

An x-ray device designed to permit the observation of the movement of internal structures in the animal body subjected to sinusoidal oscillations is described. From the x-rays taken by this device, it has been possible to determine the resonance frequency and phase shift of regions within the abdomen and thorax set in motion by external oscillatory forces. The results of observations made on anesthetized dogs show that

the visceral content of the abdomen and thorax appears to oscillate as a mass having a resonant frequency of 3 to 5 cycles per second and with damping of one-fifth to one-quarter of the critical value. (Author)

AD-290 508 Div. 16
(TISTB/MD) OTS price $1.10

Amsterdam U. (Netherlands).
(No title).
Rept. for period ending 30 Nov 62,
by L. H. van der Tweel. 30 Nov 62, 1p.
(Contract N62558-2701)
Unclassified report

DESCRIPTORS: *Electroencephalography, *Retina, Man, Light, Stimulation, Resonance.

A large number EEG and ERG recordings were made. Response to a flickering light and resonance were studied.

AD-290 509 Div. 16
(TISTB/MD) OTS price $2.60

Melpar, Inc., Falls Church, Va.
STUDY OF THE INTERMEDIARY METABOLIC PATHWAYS OF 1,1-DIMETHYLHYDRAZINE (UDMH).
Final rept. for July 61-June 62 on Toxic Hazards of Propellants and Materials,
by Milton A. Mitz, F. L. Aldrich and B. M. Vasta.
Sep 62, 22p. incl. illus. tables, 9 refs.
(Contract AF 33(616)8455, Proj. 6302)
(AMRL TDR 62-110) Unclassified report

DESCRIPTORS: Methylhydrazines, Laboratory animals, Metabolic products, Labeled substance, Radioactive isotopes, Tracer studies, Chromatographic analysis, Tissues (Biology), Reagents, Urine, Colorimetric analysis, Distribution, Excretion, Synthesis, Metabolism.

The metabolic fate of 1,1-dimethylhydrazine (UDMH) was studied in female rats and dogs. The animals were given intraperitoneal injections of C14 labelled UDMH and, after an appropriate time, body tissues were examined by paper chromatography. Six compounds were found, although not all appeared in every tissue. Three major compounds were present in urine. Identification showed one (3-10%) to be the glucose hydrazone of UDMH, and another appeared to be unreacted UDMH (50-60%). The structure of the third major component (20-25%) was not determined, although its chemical and chromatographic behavior suggested that it was a hydrazone or hydrazide of a compound of higher molecular weight than acetic or pyruvic acid. Various analytical procedures were employed for the determination of UDMH in urine, and the trisodium pentacyanoaminoferroate (TPF) procedure was found to be the most sensitive and most specific qualitative method of those tested. (Author)

AD-290 526 Div. 16
(TISTB/MD) OTS price $1.10

Walter Reed Army Inst. of Research, Washington, D. C.
A BLOOD PUMP POWERED AND CONTROLLED BY A FLUID AMPLIFICATION SYSTEM,
by T. G. Barila, D. B. Nunn, and K. E. Woodward.
1962, 5p. incl. illus. table, 4 refs.
(In cooperation with Diamond Ordnance Fuze Laboratories, Washington, D. C.)
Unclassified report

DESCRIPTORS: *Artificial heart, Man.

A new blood pump powered by compressed air and controlled by a fluid amplification system has been developed by the Army's Diamond Ordnance Fuze Laboratories and the Division of Clinical Surgery at the Walter Reed Army Institute of Research. The pump is constructed of a lucite-block housing with an inner compressible, disposable ventricle made of polyvinyl chloride. The complete unit is small, simple in design, and low in production cost. There are no cleaning or sterilization problems concerned with its use. A description of fluid amplification and the pump and its operation has been presented. (Author)

AD-290 623 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CHECKING THE REGISTRATION OF CENTRIC RELATION-SHIP FOR COMPLETE DENTURES,
by Allen A. Brewer. Aug 62, 5p. incl. illus. 5 refs. (Rept. no. SAM TDR 62-101)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Dentistry, *Dentures, *Jaws, Manufacturing methods, Measurement.

This paper presents a method for checking in the edentulous patient the accuracy of the maxillomandibular registration in the centric relation position, subsequent to transfer of this record to an articulator. A method is also presented for securing a new record when error is apparent in the record or transfer. (Author)

AD-290 718 Div. 16
(TISTB/SAT) OTS price $1.60

Forest Products Lab., Madison, Wis.
FUNGUS CULTURING EQUIPMENT: AN INOCULATING PUNCH, A PETRI PLATE SHIELD, AND A GROWTH TUBE READER,
by Joe W. Clark. Nov 62, 8p. incl. illus.
(Rept. no. 2262)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Medical equipment, *Laboratory equipment, Culture media, Growth, Decontamination, Temperature, Fungi, Design.

Three devices are described that aid in handling cultures of fungi more accurately and conveniently: (1) The inoculating punch permits cutting and transferring uniform-size inocula quickly and easily for tube, plate, or soil bottle cultures: (2) the petri plate shield supports an open plate culture and provides protection against contamination during transfers; and (3) the growth tube reader makes possible accurate quantitative measurements of lineal fungus growth rate or changes of growth rate. (Author)

AD-290 747 Div. 16
(TISTB/MD) OTS price $9.10

William Marsh Rice U., Houston, Tex.
STUDIES OF MUSTARD OIL GLUCOSIDES (II).
Final report on Simplified Food Logistics,
by Martin G. Ettlinger and Charlyne P. Thompson.
1 Nov 62, 106p. incl. illus. tables, 73 refs.
(Contract DA 19-129-qm-1689; Continuation of Contract DA 19-109-qm-1059, Proj. 7-99-01-001)
Unclassified report

DESCRIPTORS: *Plants, *Glucosides, *Thiocyanates, *Hydrolases, *Coenzymes, Reaction kinetics, Purification, Classification, Hydrolysis, Chromatographic analysis, Ascorbic acid.

Part I is an analytical catalog of the mustard oils furnished by seeds of Brassica vegetables, including cabbages, turnips, mustards and their allies. Part II describes the acceleration by Vitamin C of the enzymatic release of mustard oils from their glucosides and covers enzyme purification, the effects of chemical modification of the vitamin and the reaction mechanism. (Author)

AD-290 785 Div. 16
(TISTB/SAT) OTS price $6.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON PSITTACOSIS SUPPLEMENT, 1950-1962
Sep 62, 63p.
Unclassified report

DESCRIPTORS: *Bibliography, *Viruses, Virus pneumonia, Rickettsia, Immunology, Detection, Diseases, Chemotherapeutic agents, Epidemiology, Virus diseases.

AD-290 795 Div. 16
(TISTB/MD) OTS price $1.10

Texas A. and M. Coll., College Station.
THE INFLUENCE OF THE NATURE OF DIETARY FAT ON LIPOGENESIS AND CHOLESTEROGENESIS.
Final rept.,
by Raymond Reiser. 1962, 3p.
(Contract Nonr-145000, Proj. NR 101 225)
Unclassified report

DESCRIPTORS: *Fats, *Fatty acids, *Cholesterol, Laboratory animals, Liver, Blood, Lipoproteins, Labeled substances, Radioactive isotopes, Lipids, Acetates, Rats, Diet, Biosynthesis.

AD-290 808 Div. 16
(TISTB/MD) OTS price $2.00

New York City Hospital, N. Y.
EFFECTS OF THERMAL ENERGY ON RETINAL FUNCTION.
Final report on Aerospace Systems Personnel Protection,
by Jerry Hart Jacobson, Blossom Cooper, and Harold W. Najac. Aug 62, 70p. incl. illus. tables, 4 refs.
(Contract AF 33(616)7685, Proj. 6301)
(AMRL TDR 62-96) Unclassified report

DESCRIPTORS: *Retina, *Thermal radiation, Laboratory animals, Rabbits, Test methods, Infrared radiation, Infrared images, Flash burns, Burns.

The retinas of pigmented, grey chinchilla rabbits were exposed to the visible, and, to the visible and near infrared parts of the spectrum to determine the retinal burn threshold. The study included the variation of four primary parameters: the rate of delivery of energy, the retinal image size, the exposure time, and the spectral characteristics of the source. Analysis of the data indicated the following: for a given irradiance, the dose necessary to produce a threshold burn increased with the size of the retinal image, for equal total irradiance a higher dose was necessary when the near infrared was included in the spectrum than when the visible alone was present, and for a given retinal image, the threshold dose is determined as a function of the irradiance. (Author)

AD-290 827 Div. 16
(TISTB/SAT) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW DEVELOPMENTS IN MEDICAL TECHNOLOGY (SELECTED ARTICLES).
29 Oct 62, 31p. incl. illus. (Trans. no. FTD-TT-62-803 from Novosti Meditsinskoy Tekniki 3:pp. 27-45, 1960)
Unclassified report

DESCRIPTORS: *Medical research, Electrocardiography, Exercise, Heart, Medical equipment, USSR.

Contents:
Remote control device for recording human electrocardiograms
Telemetric investigation of electrocardiograms of athletes

AD-290 936 Div. 16
(TISTB/SAT) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE SUSCEPTIBILITY OF BABOON (PAPIO DOGUERA) KIDNEY CELLS TO HUMAN ENTEROVIRUSES,
by Seymour S. Kalter, Rafael A. Fuentes-Marins and others. Oct 62, 5p. incl. tables, 12 refs.
(Rept. no. SAM TDR 62-115)
Unclassified report

DESCRIPTORS: *Viruses, *Cells (Biology), Poliomyelitis virus, Primates, Kidney, Trypsin, Erythrocytes, Hemagglutinins, Serum, Growth, Culture.

Studies were made to learn if baboon kidney cells are as susceptible as monkey kidney cells to human enteroviruses. Since the baboon (Papio doguera) is a 'clean' animal--that is, relatively free from native viruses--it should be useful as a model in studying human infections. On culture, baboon kidney cells showed high susceptibility to most human enteroviruses. Their usefulness is inhanced in that they indicated the presence of contaminating SV40 virus. (Author)

AD-290 937 Div. 16
(TISTB/MD) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CEREBRAL EXCESS LACTATE PRODUCTION DURING HYPERVENTILATION OF ANESTHETIZED DOGS,
by Stephen M. Cain. Sep 62, 6p. incl. illus. tables, 17 refs. (Rept. no. SAM TDR 62-109)
(Proj. no. 7758)
Unclassified report

DESCRIPTORS: *Oxygen poisoning, *Blood circulation, *Cerebral cortex, Laboratory animals, Dogs, Blood vessels, Constriction, Pyruvic acid, Oxidation, Metabolism, Anoxia, Brain, Lactic acid.

Eight anesthetized, curarized dogs were ventilated to alveolar P(CO2) of 40, 20, and 10 mm. Hg. Blood samples were drawn from an artery and sagittal sinus and analyzed for P(CO2), P(O2), pH, hemoglobin saturation, lactic acid, and pyruvic acid. The vasoconstriction of the cerebral vessels was clearly demonstrated by the increased arteriovenous difference in hemoglobin saturation which increased on the average from 26% to 45% and to 48% during the two periods of hyperventilation. Sagittal sinus P(O2) declined from 41 mm. Hg during the control to 29 and to 25 mm. Hg with hyperventilation. Calculation of the cerebral excess lactate production from the measurements of lactic and pyruvic acids showed no significant increase with hyperventilation. The conclusion was made, with reservation, that cerebral oxygenation during even severe hyperventilation was sufficient to maintain normal oxidative metabolism. (Author)

AD-290 938 Div. 16
(TISTB/CCH) OTS price $7.60

North Carolina State College, Raleigh.
FACTORS INFLUENCING VASCULAR PLANT ZONATION IN NORTH CAROLINA SALTMARSHES.
Final rept., 1 Nov 60-31 Oct 62,
by Ernest O. Beal and Arthur W. Cooper.
31 Oct 62, 70p. incl. illus. tables, refs.
(Contract Nonr-48609)
Unclassified report

DESCRIPTORS: *Swamps, *North Carolina, *Plants, *Ecology.

This study was initiated with the objectives of describing the vegetation of North Carolina saltmarshes, the composition of saltmarsh communities, and the environmental conditions under which these communities exist; determining variations in environmental conditions and formulating levels of tolerance for the various saltmarsh species; and discovering evidence of past vegetational changes, thus making possible predictions of future changes. Properties of the soil solution were determined from samples collected at predetermined depths by plastic pipe wells. Nutrient solution experiments were conducted to determine the response of Spartina alterniflora, Distichlis spicata, Spartina patens, and Juncus roemerianus to various NaCl and Fe concentrations. Saltmarsh vegetation may be predicted to continue invading upland vegetation if relative sea level continues to rise. The lower edge of the saltmarsh may remain static, advance, or retreat depending on the relative rates of subsidence and alluvial deposition. Coastal dunes, the present barriers between saltmarsh and ocean, will continue to be driven landward over the marsh surface by an encroaching sea and wind deposition of sand. (Author)

AD-290 949 Div. 16
(TISTB/SAT) OTS price $1.10

Biological Labs., Frederick, Md.
DETERMINATION OF THE DEGREE OF ACTIVITY OF AN ANTIANTHRAX SERUM USED ON WHITE MICE,
by N. V. Likhachev. 30 Oct 62, 4p. (Trans. no. 697 from Trudy (Proceedings ...) 6:262-264, 1956)
Unclassified report

DESCRIPTORS: *Anthrax, *Immunology, USSR, Culture media, Serum.

A series of experiments, aimed at discovering a more precise method for determining the strength or activity of antianthrax serum than the presently widespread method of testing with innoculation of rabbits is described. The strength of antianthrax serum of strain STI on the basis of the number of white mice dying upon innoculation with various concentrations of the serum was calibrated. (Author)

AD-291 038 Div. 16
(TISTB/SAT) OTS price $1.10

Biological Labs., Frederick, Md.
AEROSOL IMMUNIZATION WITH DRY DUST VACCINES AND TOXOIDS,
by N. I. Aleksandrov, N. Ye. Gefen and others.
Sep 62, 7p. (Trans. no. 686, from Journal of Microbiology, 7:46-50, Moscow, July 62)
Unclassified report

DESCRIPTORS: *Plague, *Bacterial aerosols, Impingers, USSR, Blood, Pasteurella, Leukocytes, Immunization.

Aerosol immunization of 543 healthy young men (18-25 years) using the dust plague vaccine in a dose of 150-200 million live microbes of the EB strain was conducted. After immunization, follow-up examinations were given, including X-rays of thoracic organs and hematological examinations, to 157 men. Clinically expressed post-vaccinal reactions were almost nil. There was no temperature reaction, no changes in general health, and no changes in the thoracic organs. Clinical analysis of the blood, however, showed marked increases in leukocytes, particularly in the first few days after immunization. The aerosol immunization method proved to be simple to conduct and the reaction to this method was considerably milder than reactions to the subcutaneous and epidermic methods of vaccination with the dust plague vaccine. (Author)

AD-291 040 Div. 16
(TISTB/SAT) OTS price $1.10

Biological Labs., Frederick, Md.
INTRADERMAL ALLERGY TEST FOR Q FEVER,
by M. Yu. Morozova. Oct 62, 5p. 3 refs.
(Trans. no. 694, from Journal of Microbiology, pp. 28-31, 1955)
Unclassified report

DESCRIPTORS: *Q fever, *Allergy, Rickettsia, Antigens, Edema, Skin, Antibodies, USSR, Diagnosis, Test.

An allergic skin reaction with the allergen from Rickettsia burnetii was noted in patients with Q fever starting with the ninth day of the disease (period of significant observations). An allergic reaction with the same allergen was noted in those who had had Q fever one to three years before. An allergic reaction in persons did not cause a general reaction. A skin reaction with the Q allergen did not occur in healthy persons or in those with other diseases. (Author)

AD-291 042 Div. 16
(TISTB/SAT) OTS price $1.60

Biological Labs., Frederick, Md.
RECOVERY OF FILTERABLE FORM OF ANTHRAX BACILLUS FROM ANTHRAX ANTISERA.
Oct 62, 10p. (Translation no. 696)
Unclassified report

DESCRIPTORS: *Anthrax, *Mutations, Pathology, USSR, Culture media, Serum, Stability, Immunology, Antibodies, Cells (biology).

Data indicate that therapeutic and precipitating anthrax sera contain filterable forms of microbes, by virtue of which they are obtained in the process of hyperimmunization of animals. In the process of regeneration of avisual forms into visual forms it was established that the ontogenesis of the anthrax microbes is not monomorphic, but pleomorphic. In the opinion of the present authors the filterable forms of microbes cannot constitute a danger in therapeutic antianthrax serum because they already are in the second stage of regeneration, i.e. when they acquire typical microbial form they do not have a virulence which may constitute a danger to the animal organism. Of five strains of anthrax culture extracted from therapeutic and precipitating anthrax sera only 2 strains had become strengthened to the stage of being virulent to guinea pigs (but not to rabbits), and only after repeated transplantation in nutrient media and passage through white mice. (Author)

AD-291 053 Div. 16
(TISTB/MD) OTS price $2.60

Andean Inst. of Biology (Peru).
THE INFLUENCE OF HIGH ALTITUDES ON THE ELECTRICAL ACTIVITY OF THE HEART. ELECTROCARDIOGRAPHIC AND VECTORCARDIOGRAPHIC OBSERVATIONS IN ADOLESCENCE AND ADULTHOOD,
by Dante Penaloza, Raul Gamboa and others.
Aug 62, 22p. incl. illus. tables, 84 refs.
(Rept. no. SAM-TDR-62-87)
(Contract AF 41(657)249, Proj. 7758)
Unclassified report

DESCRIPTORS: *Electrocardiography, *High altitude, Man.

Electrocardiographic and vectorcardiographic observations were obtained in 550 normal subjects--300 at sea level and 250 in Morococha, 14,900 feet above sea level. A comparative study was made in three age groups ranging from 15 to 60 years. The ventricular activation process shows important differences between subjects living in the two places studied. In adolescent and adult inhabitants of high altitudes the SAQRS range is wide, the configuration of the QRS complex is highly variable, both in the limb and in the precordial leads, and the two-dimensional projections of the spatial QRS loop show wide diversity. (Author)

AD-291 054 Div. 16
(TISTB/SAT) OTS price $1.10

Pasadena Foundation for Medical Research, Calif.
COMPARATIVE STUDY OF HUMAN AND MONKEY LEUKOCYTES IN CULTURE,
by Yasushi Ohnuki, Akio Awa, and C. M. Pomerat.
Sep 62, 7p. incl. tables, 8 refs. (Rept. no. SAM-TDR-62-99)
(Contract AF 41(657)357, Proj. 7757)
Unclassified report

DESCRIPTORS: *Leukocytes, *Radiation effects, *Cells (Biology), Culture media, Chromosomes, Mitosis, Hematology, Histology, Blood.

To develop a satisfactory culture procedure for rhesus monkey leukocytes, several technical variations of the routine method were investigated. Those included in the present study were (1) the use and the amount of different kinds of phytohemagglutinins, (2) the separation of erythrocytes after preservation or centrifugation, (3) sera derived from the horse, the calf, and the monkey for supplementing the culture medium, and (4) the ratio of host serum containing leukocytes to the nutrient fluid. None of these factors gave satisfactory results for monkey samples, but all were useful for human cells. Such an unusual situation might possibly be caused by differences in the physicochemical and cellular properties of the blood of the monkey and of man. (Author)

AD-291 056 Div. 16
(TISTB/MD) OTS price $1.10

Washington U., Seattle.
A POSSIBLE SOURCE OF ERROR IN THE MEASUREMENT OF 5-HYDROXYTRYPTOPHAN DECARBOXYLASE ACTIVITY IN RAT TISSUE,
Semi-annual rept. no. 13, pt. 1, 1 Dec 61-31 May 62,
by A. Horita. 15 Oct 62, 3p. incl. illus. 3 refs.
(Contract DA 18-108-cml-6364, Proj. 4-08-02-018-01)
Unclassified report

DESCRIPTORS: *Enzymes, *Serotonin, Laboratory animals, Kidney, Cyanides, Cytochrome oxidase, Drugs, Test methods, Determination, Hydroxides, Tryptophan, Biosynthesis.

When rat kidney homogenate is incubated with 5-hydroxytryptophan at pH 8.1, serotonin is produced. Its degradation by this preparation can be prevented in part by a monoamine oxidase inhibitor. However, another pathway, presumably the cytochrome oxidase, also attacks both substrate and serotonin, thus causing erroneous results. This may be avoided by carrying out the experiment in an anaerobic medium. (Author)

AD-291 057 Div. 16
(TISTB/MD) OTS price $1.10

Washington U., Seattle.
SOME BIOCHEMICAL STUDIES ON PSILOCYBIN AND PSILOCIN.
Semi-annual rept. no. 13, pt. 2, 1 Dec 61-31 May 62,
by A. Horita. 15 Oct 62, 6p. incl. illus. 8 refs.
(Contract DA 18-108-cml-6364, Proj. 4-08-02-018-01)
Unclassified report

DESCRIPTORS: *Hallucinogens, Phosphatases, Intestine, Kidney, Cytochrome oxidase, Serotonin, Oxidases, Distribution, Pharmacology, Laboratory animals, Metabolism inhibitors, Metabolism.

Some recent biochemical studies with the 4-substituted indoleamines, pailocybin and psilocin, are reviewed. Both in vivo and in vitro psilocybin is rapidly dephosphorylated to liberate its 4-OH analogue, psilocin. The possibility that psilocin may be the pharmacologically active agent after psilocybin administration is discussed. Under in vitro conditions the heart and kidney tissues of various animals are capable of oxidizing psilocin to a blue colored product. This oxidation process is catalyzed by the cytochrome c - cytochrome oxidase pathway, and it appears to be an action at the -OH group on the indole ring. (Author)

AD-291 058 Div. 16
(TISTB/MD) OTS price $1.60

Washington U., Seattle.
THE ANTAGONISM OF HYDRAZINE-TYPE INHIBITORS OF MONOAMINE OXIDASE BY SODIUM PYRUVATE.
Semi-annual rept. no. 13, pt. 3, 1 Dec 61-31 May 62,
by A. Horita and C. Matsumoto. 15 Oct 62, 9p. incl. illus. table, 16 refs.
(Contract DA 18-108-cml-6364, Proj. 4-08-02-018-01)
Unclassified report

DESCRIPTORS: *Pyruvic acid, *Hydrazines, Laboratory animals, Liver, Enzymes, Drugs, Amines, Brain, Blood pressure, Hydrazones, Inhibition, Oxidases.

The incubation of several hydrazine-type inhibitors of monoamine oxidase (MAO) with 0.05 - .10 M sodium pyruvate resulted in a considerable loss of enzyme inhibiting activity. Non-hydrazine inhibitors of MAO were unaffected by this procedure. The activity of the unsubstituted compound, beta-phenylisopropylhydrazine (PIH) was also antagonized when injected after administration of large doses of sodium pyruvate to rats. Substituted hydrazines, however, were not antagonized under these in vivo conditions. The preincubation of PIH with pyruvate also caused a

loss of pressor activity of the hydrazine compound. It is concluded that the antagonism of the biochemical and pharmacological actions of the hydrazine-type inhibitors of MAO by sodium pyruvate results from an interaction of the hydrazine moiety with the carbonyl group of pyruvate, leading to the formation of a biologically inactive hydrazone structure. (Author)

AD-291 079 Div. 16, 29
(TISTB/MD) OTS price $.75

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGICAL PROTECTION OF THE CSU-4/P HIGH-ALTITUDE PRESSURE SUIT.
Final rept., June 58-Jan 59 on High-Altitude Physiology,
by Charles L. Wilson. Sep 62, 18p. incl. illus. tables, 61 refs. (Rept. no. AMRL TDR 62-112)
(Proj. 7164)
Unclassified report

DESCRIPTORS: *Pressure suits, High altitude, Low pressure research, Design, Man, Helmets, Tests, Effectiveness.

The CSU-4/P high-altitude bladder pressure suit was designed mainly for quick donning. Each of 15 subjects who wore the suit ensemble was rapidly decompressed from 282 mm Hg chamber pressure (7.6 km) to 42 mm Hg chamber pressure (19.8 km) in an average of 1.5 seconds and then further to 33.6 mm Hg (21.4 km). All subjects were able to remain at 33.6 mm Hg for 5 minutes without any difficulty. Each of 14 of the subjects was again successfully exposed to the same profile except that one hand was bare and the other hand was protected by an unpressurized leather flying glove. Eight subjects were easily able to remain at 8 to 3 mm Hg chamber pressure (30.6 to 36.7 km) continuously for 120 minutes. One subject wore the CSU-4/P pressure suit ensemble during a special decompression study. (Author)

AD-291 081 Div. 16
(TISTB/MD) OTS price $8.10

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON EQUINE ENCEPHALOMYELITIS.
June 55, 86p.
Unclassified report

Venezuelan Equine Encephalomyelitis, pp. 68-72.

DESCRIPTORS: *Equine encephalomyelitis, *Bibliography, Pathology, Immunization, Arthropods, Disease carriers, Animals, Epidemiology, Diagnosis.

AD-291 082 Div. 16
(TISTB/SAT) OTS price $9.10

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON DENGUE AND YELLOW FEVERS.
PART A. DENGUE FEVER. PART B. YELLOW FEVER.
11 Oct 56, 104p.
Unclassified report

DESCRIPTORS: *Bibliography, *Viruses, *Virus diseases, Pathology, Immunization, Disease carriers, Biological stains, Epidemiology.

AD-291 143 Div. 16
(TISTB/MD) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CREVICULAR DEPTH OF THE SECOND MOLAR IN IMPACTED THIRD MOLAR SURGERY,
by Lucian Szmyd and Warren R. Hester. Sep 62, 6p. incl. illus. tables, 5 refs. (Rept. no. SAM TDR 62-116)
(Proj. no. 7756)
Unclassified report

DESCRIPTORS: *Dental surgery, Mouth, Teeth, Man, Dental equipment, Dental research, Pathology.

Periodontal health may be improved by the surgical removal of the impacted third molar. The effect of such surgery on the crevicular depth of the adjacent second molar was determined in 75 cases by measurement with a periodontal probe. Measurements were made presurgically and 6 and 12 months afterward. Crevicular depth of the mandibular second molar was found to be significantly reduced after removal of the impacted tooth. There was no difference in the effects of two surgical methods--the higher bur speed technic as compared to the mallet and chisel method. (Author)

AD-291 146 Div. 16
(TISTB/MD) OTS price $1.10

Wisconsin U., Madison.
(No title).
Annual status rept., 31 Aug 61-1 Sep 62,
by Harlyn O. Halvorson. 1962, 12p. incl. illus. tables.
(Contract AF 49(638)314)
Unclassified report

DESCRIPTORS: *Proteins, Peptides, Yeasts, Amino acids, Labelled substances, Radioactive isotopes, Nucleotides, Adenosine phosphates, Biosynthesis.

An active system has been achieved in yeast for amino acid incorporation in cell free systems. The properties of this system are largely analogous to those reported in bacteria and in higher organisms. This system will provide an experimental tool for studying the mechanism of potein synthesis in yeast. (Author)

AD-291 198 Div. 16
(TISTB/LMH) OTS price $1.10

Bernice P. Bishop Museum, Honolulu, T. H.
MEDICALLY IMPORTANT ARTHROPODS OF SOUTHEAST ASIA AND PACIFIC ISLANDS.
Annual progress rept., Nov 61-Oct 62,
by J. L. Gressitt. Oct 62, 5p. incl. table.
(Grant DA-MD-49-193-62-G47)
Unclassified report

DESCRIPTORS: *Arthropods, *Insects, Parasites, Collecting methods, Medical research, Asia.

17. METALLURGY

AD-289 604 Div. 17
(TISTM/BRW) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - 2024-T86 ALUMINUM - STRESS TREATED S-N FATIGUE CURVES FOR - DETERMINATION OF,
by J. C. Batteiger. 23 Aug 55, 7p. incl. illus. tables (Rept. no. FGT-1469)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Fatigue (Mechanics), Stresses, Dispersion hardening, Mechanical properties.

Test results indicate that a slight increase in the fatigue life of 0.051-in. Al alloy sheet material stressed in tension-tension fatigue can be gained for stress levels below approximately 37,000 psi by applying a tensile stress of 35,000 psi to the material during the final 0.5 hour of the normal 375 F and 6.5 hour precipitation hardening treatment. The fatigue life at stress levels above approximately 37,000 psi appears to be reduced by using this treatment to replace the normal precipitation hardening treatment. Indications are that the endurance limit at 10,000,000 of tension-tension fatigue is increased from approximately 20,000 psi to approximately 23,000 psi by stressing the material in tension to 35,000 psi during the final 0.5 of the 6.5 hr 375 F precipitation hardening treatment. (Author)

AD-289 609 Div. 17, 26
(TISTM/BRW) OTS price $3.00

General Electric Co., Cincinnati, Ohio.
DETERMINATION OF ENGINEERING PROPERTIES OF MAR-STRAINED STEELS.
Rept. for 15 Nov 60-12 Jan 62 on Materials Application,
by R. E. Yount. Aug 62, 145p. incl. illus. tables, 7 refs.
(Contract AF 33(616)7655, Proj. 7381)
(ASD TDR 62-230) Unclassified report

DESCRIPTORS: *Steel, *Stainless steel, Austenite, Martensite, Deformation, Heat treatment, Aging, Test methods, Stresses, Cylindrical bodies, Hydrostatic pressure, Fatigue (Mechanics), Tool steel, Alloys, Tensile properties, Hardening.

The Mar-Strain response (the addition of strain and aging to quenched and tempered steels) was determined for eight alloys representing four classes of steel: low alloy martensitics, secondary hardening martensitics (hot work die steels), semi-austenitic and martensitic stainless. All four alloy classes responded to the process by demonstrating yield strength increases of 10 to 20%. It was found that the tempered structure and strain hardening characteristics were the most significant factors controlling the Mar-Strain response. Two alloys were selected for determination of their engineering properties including uniaxial tensile, fatigue and center notch properties and biaxial performance in subscale cylinder tests. One alloy, Ladish D6AC (.46%C, 1%Cr, 1%Mo), was capable of being Mar-Strained to a 275,000 psi .2% yield strength. A second alloy, Modified S-5 (0.48%C, 2%Si, 0.5%Mo, 0.25%V), was capable of being Mar-Strained to a 300,000 psi 0.2% yield strength. Mar-Straining was found to increase the fatigue strength of both alloys. The process was adequately demonstrated in the sub-scale pressure vessel tests. Burst strengths (greater than 350,000 psi hoop) achieved with the Mar-Strained S-5 cylinders were higher than any previously reported for a homogeneous material. (Author)

AD-289 664 Div. 17
(TISTM/BRW) OTS price $.75

Defense Metals Information Center, Columbus, Ohio.
IDENTIFICATION OF MICROCONSTITUENTS IN SUPERALLOYS,
by C. H. Lund and H. J. Wagner. 15 Nov 62, 22p. 41 refs. (DMIC memo. no. 160)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Heat resistant alloys, Microstructure, Electron microscopy, X-ray diffraction analysis, Nickel alloys, Cobalt alloys, Iron alloys, Intermetallic compounds, Carbides, Nitrides, Borides, Chemical analysis, Metallurgical analysis, Microscopy, Phase studies.

AD-289 697 Div. 17
(TISTM/BRW) OTS price $2.60

Climax Molybdenum Co. of Michigan, Detroit.
THE DEVELOPMENT AND EVALUATION OF TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 2, 15 June-15 Sep 62,
by Gordon D. McArdle, Robert Q. Barr, and M. Semchyshen. 15 Sep 62, 23p. illus. tables.
(Contract NOw 62-0419-c)
Unclassified report

DESCRIPTORS: *Tungsten alloys, Niobium alloys, Hafnium alloys, Molybdenum alloys, Zirconium alloys, Carbon alloys, High temperature research, Hardness, Deformation, Lubricants, Microstructure, Casting, Melting, Electric arcs, Rods, Metal coatings, Molybdenum, Fracture (Mechanics), Extrusion.

Five W-base vacuum-arc-cast alloys were extruded to round bar form, but were found to be extensively cracked. Extremely poor recoveries of sound stock were realized. Subsequent canning of additional extrusion blanks of the same alloys in Mo facilitated the production of sound extruded billets. Attempts to convert the extruded materials to 1/2-in.-diam bar stock by rolling resulted in rupturing of the bars. Seven new heats were vacuum-arc-cast, five to duplicate the earlier ingots and two additional compositions. All of the alloys were prepared for extrusion by canning in Mo. High recoveries of extruded materials were obtained. Two of the alloys which had sustained low reduction ratios during extrusion could not be converted to 1/2-in.-diam bar stock by swaging. On the other hand, the billets that had been subjected to heavy reductions during extrusion were successfully swaged to 1/2-in.-diam bar stock with resultant high recoveries. (Author)

AD-289 847 Div. 17, 26
(TISTM/AJM) OTS price $3.60

Sylvania Electric Products, Inc., Towanda, Pa.
DEVELOPMENT AND PRODUCTION OF IMPROVED MOLYBDENUM SHEET BY POWDER METALLURGY TECHNIQUES.
Interim rept. no. 16, 1 June-31 July 62,
by Roger B. Bargainnier. 19 Oct 62, 29p. incl. illus. tables.
(Contract NOa(s) 60-6018-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Sheets, Titanium alloys, Zirconium alloys, Carbon alloys, Powder alloys, Manufacturing methods, Rolling mills, Sintering, Heat treatment, Metal forming presses, High temperature research, Temperature, Microstructure, Grains (Metallurgy), Metal plates, Processing, Powder metallurgy.

The billets for the final experiments to optimize the processing of powder-metallurgical Mo-0.5Ti-C sheet were rolled. Breakdown rolling can be accomplished by heavy reductions, and the rolling temperature has a marked affect on the grain structure. Among the compositional variations which failed during rolling were Mo-1.0Ti-0.011C, Mo-1.5Ti-0.011C, Mo-0.49Ti-0.072C (made from Mo and TiC powders), and Mo-0.50Ti-0.09Zr-0.016C. (Author)

AD-289 857 Div. 17, 26
(TISTM/BRW) OTS price $4.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
DESIGN DATA STUDY FOR COATED COLUMBIUM ALLOYS
Bimonthly rept. no. 5, 21 Aug-21 Oct 62,
by J. D. Gadd. 21 Nov 62, 38p. incl. illus. tables, 25 refs. (Rept. no. TM 3544-67)
(Contract NOw 62-0398-c)
Unclassified report

DESCRIPTORS: *Niobium alloys, *Sheets, High temperature research, Oxidation inhibitors, Design, Data, Microstructure, Diffusion, Chromium alloys, Titanium alloys, Silicon alloys, Silicides, Processing, Coatings, Mechanical properties.

The design data study of Pfaudler and TRW protective coated 30 mil Fansteel 85 alloy sheet is in progress. Specimen designs and preparation, coating application techniques and evaluation test procedures are presented. Cyclic oxidation tests in air at 1600 to 2600 F were conducted to establish basic protective characteristics of the two coating-base metal systems. Tensile properties of FS-85 alloy sheet were determined (1) uncoated in vacuum and (2) coated in air from room temperature to 2600 F. A comparison of the mechanical properties of uncoated and coated FS-85 alloy is graphically presented. Tentative results are reported concerning an evaluation of the prestrain tolerance of the two coatings on FS-85 alloy sheet at various temperatures and the resultant effect on oxidation protection at 1600 and 2600 F. Stress rupture properties of coated FS-85 alloy are being determined in air at temperatures from 1600 to 2600 F, and tentative results are presented. (Author)

AD-289 859 Div. 17
(TISTM/BRW) OTS price $2.75

Pratt and Whitney Aircraft, Middletown, Conn.
WORK HARDENING MECHANISMS IN BODY CENTERED CUBIC METALS.
Interim rept., 1 Feb 61-31 Jan 62 on Metallic Materials,
by Donald P. Gregory, George H. Rowe, and Alan N. Stroh. Sep 62, 121p. incl. illus. tables, 85 refs.
(Contract AF 33(616)7855, Proj. 7351)
(ASD TDR 62-354)
Unclassified report

DESCRIPTORS: *Metals, *Metallic crystals, Niobium, Single crystals, Crystal structure, Lattices, Shear stresses, Impurities, Theory, Tests, Hardening, Deformation.

Analysis of a literature survey indicates that the following properties are important in governing the dislocation arrangement, and hence the work hardening mechanism, in a particular metal crystal: (1) number of slip systems and slip directions, (2) possibility of dislocation interactions to produce Lomer-Cottrell type barriers, (3) extension of dislocations, stacking fault energy (ease of climb and cross slip, formation of edge dipoles and elongated loops during deformation, multiplication of dislocations by double cross slip), (4) energy to form lattice vacancies or interstitial atoms by non-conservative motion of jogs in screw dislocations compared to the energy for conservative motion of the jogs along screw dislocations (whether or not point defects are formed during deformation), and (5) impurity atom-dislocation interactions (locking of sources). Results are presented of an experimental work hardening program with polycrystalline and single crystal columbium. (Author)

AD-290 054 Div. 17, 26
(TISTM/BRW) OTS price $2.60

Fansteel Metallurgical Corp., North Chicago, Ill.
TUNGSTEN SHEET ROLLING PROGRAM.
Interim rept. nos. 10 and 11, 1 May-31 Oct 62,
by George C. Bodine. 1 Nov 62, 19p. incl. illus. tables.
(Contract NOw 60-0621-c)
Unclassified report

DESCRIPTORS: *Tungsten, *Sheets, *Manufacturing methods, Metal plates, Heat treatment, Deformation, Crystallization, Stresses, Tensile properties, Microstructure, Conical bodies, Lathes, Processing, Tests, Data, Mechanical properties, Production, Rolling mills.

Experimental forming of pilot 0.060-in.-thick W sheet was conducted to assist in establishing the material type for the remaining material to be produced in the Tungsten Sheet Rolling Program. The decision was subsequently made to produce sizes of W flat rolled product which would be compatible to both the requirements of the Phase II refractory metal program and the utilization of material previously prepared for the Tungsten Sheet Rolling Program. W plate, 0.250-in.-thick, and W sheet in thicknesses of 0.100, 0.060, 0.020, and 0.010 in. will be produced. Both 0.250-in.-plate and 0.100-in.-sheet are now in the final stages of preparation. (Author)

AD-290 083 Div. 17, 27
(TISTA/SEB) OTS price $1.60

Propulsion Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO OCTOBER 2-4, 1962. QUEST FOR HEAVY PARTICLE PROPULSION,
by Robert E. Hunter. 1962, 10p. incl. illus. 6 refs.
Unclassified report

DESCRIPTORS: *Particles, *Electric propulsion, Solids, Liquids, Drops, Electron charge, Theory, Specific impulse, Colloids, Power supplies, Propulsion, Symposia.

Although the primary motivation for heavy particle electrical propulsion research is the attainment of efficient operation in the intermediate range of specific impulse (1000-5000 seconds), the concept gives promise of efficient operation at any desired specific impulse. The many ap-

proaches being pursued are not without practical problems but the accomplishments to date vindicate the early proponents and justify the continued enthusiasm of the electric propulsion scientific community. The present-day problems of charge/mass ratio distribution (including ionic current and neutral loss), low source current, agglomeration, etc. will all be overcome in time. It remains only to be shown what compromises must be made in order to achieve a usable thrustor and then comparison with other thrustors to determine competitiveness. (Author)

AD-290 094 Div. 17
(TISTM/EJH) OTS price $14.50

Syracuse U. Research Inst., N. Y.
PROCEEDINGS OF THE EIGHTH SAGAMORE ORDNANCE MATERIALS RESEARCH CONFERENCE. MECHANISMS OPERATING IN METALS AT ELEVATED TEMPERATURES, CONDUCTED AT SAGAMORE CONFERENCE CENTER RACQUETTE LAKE, NEW YORK. AUGUST 22 TO 25, 1961.
1961, 209p. incl. illus. tables, refs.
(Contract DA 30-069-ORD-3298)
Unclassified report

DESCRIPTORS: *Metals, *Crystals, *Solids, *High temperature research, Crystal structure, Silicon, Grains (Metallurgy), Deformation, Fracture (Mechanics), Phase transitions, Crystallization, Impurities, Diffusion, Creep, Oxygen, Water vapor, Oxidation, Electrons, Configuration, Conferences, Mechanical properties.

Contents:
Structural aspects of metals
Role of imperfections in diffusion
Dislocations and diffusion in silicon (prepared discussion)
Recrystallization and phase transformation
Role of electron configuration on recrystallization (prepared discussion)
Solid-gas reactions
Grain boundary behavior in high temperature deformation and fracture

AD-290 215 Div. 17, 26
(TISTM/BRW) OTS price $11.00

Illinois U., Urbana.
FATIGUE BEHAVIOR OF WELDED JOINTS AND WELDMENTS IN HY-80 STEEL SUBJECTED TO AXIAL LOADINGS,
by A. J. Hartmann and W. H. Munse. July 62, 135p. incl. illus. table, 9 refs. (Structural Research series no. 250)
(Contract NObs-77137)
Unclassified report

DESCRIPTORS: *Welded joints, *Steel, *Welds, Stresses, Temperature, Heat transfer, Penetration, Design, Failure (Mechanics), Metal plates, Tests, Fatigue (Mechanics).

Axial load fatigue tests on various types of welded joints and weldments in HY-80 steel are reported. The tests were carried out using three stress cycles; complete reversal, zero-to-tension, and half tension-to-tension. Most of the test lives lie between 2,000 and 600,000 cycles. These results have been used to develop Modified Goodman diagrams. A preliminary series of fatigue tests was carried out to study the effects of interpass temperature, lack of penetration, type of electrode, and longitudinal fillet welded attachments. When the specimens of a given test series failed due to an internal flaw, there was often a large amount of scatter in the test lives at a given stress level. Apparently internal weld flaws have a significant effect on the fatigue behavior of a welded joint. (Author)

AD-290 216 Div. 17, 26
(TISTM/BRW) OTS price $4.60

Illinois U., Urbana.
FATIGUE BEHAVIOR OF DEFECTIVE WELDED JOINTS IN HY-80 STEEL SUBJECTED TO AXIAL LOADING,
by J. E. Zimmerman, Jr. and W. H. Munse. July 62, 39p. incl. illus. tables, 16 refs. (Structural Research series no. 252)
(Contract NObs-77137)
Unclassified report

DESCRIPTORS: *Welded joints, *Welds, *Steel, Metal plates, Porosity, Slags, Penetration, Heat transfer, Non-destructive testing, Dyes, Magnetic fields, Radiographic analysis, Tests, Fatigue (Mechanics).

Defective welds in 3/4 in. HY-80 steel and the fatigue behavior of such welds were investigated. Included were lack of penetration, porosity, and slag inclusions; the major types of internal weld flaws which are likely to occur under field conditions. Methods of consistently producing these weld flaws were developed which made possible the prediction of the size and location of the flaws. Various means of non-destructive testing, including visual, magnetic particle, dye penetrant, and radiographic inspection, were used to investigate the defective weldments. In addition, a method of measuring the size and the depth of the flaws in the welds was developed. Axial fatigue tests on plain plate specimens and transverse butt-welded specimens have been conducted to investigate the effects of surface condition and the presence of defective welds on the behavior of such members. The results of the tests have indicated that the flaws can have a marked effect on the fatigue resistance of the members. (Author)

AD-290 247 Div. 17, 14, 27
(TISTM/EJH) OTS price $11.50

Rocketdyne, Canoga Park, Calif.
ADVANCED TECHNOLOGY FOR PROPULSION SYSTEMS. VOLUME III. REFRACTORY MATERIALS.
Final rept. vol. 3,
by J. W. Robinson. 15 Dec 61, 143p. incl. illus. tables (Rept. no. R-3350-3)
(Contract NOw 60-0445-c)
Unclassified report

DESCRIPTORS: *Refractory materials, *Rocket motors, *Rocket motor nozzles, Heat resistant alloys, Metals, Graphite, Intermetallic compounds, Carbides, Borides, Nitrides, Silicides, Sulfides, Oxides, Production, Manufacturing methods, Mechanical properties, Physical properties.

In order to withstand high temperature and erosion conditions encountered with aluminized propellants new materials are being developed and the more established refractory metals (carbides, nitrides, borides, oxides, silicides, sulfides, intermetallic compounds and graphites) are being investigated. Physical and mechanical room-temperature properties for most of the refractory materials were compiled and tabulated. High temperature physical and mechanical properties are presented for some of the refractory materials. Brief descriptions of the various materials are included. Material suppliers and fabricators, and some fabrication methods used in rocket nozzles are discussed.

AD-290 260 Div. 17
(TISTP/JW) OTS price $1.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
ADSORPTION AND SORPTION COMPLEXES.

Final technical rept., 1 July 61-30 June 62, by J. L. Whiteman. 30 June 62, 13p. incl. illus. table, 7 refs.
(Contract DA 91-591-EUC-1662) Unclassified report

DESCRIPTORS: *Adsorption, *Metals, Crystals, Atoms, Electrical properties, Semiconductors, Ion exchange, Silver, Mercury, Vapors, Pressure.

AD-290 278 Div. 17
(TISTM/BRW) OTS price $2.50

Southern Research Inst., Birmingham, Ala.
AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS.
Summary technical rept., 23 Dec 60-23 Oct 62, by J. D. Morrison, P. C. Jenkins and J. R. Kattus. 21 Nov 62, 95p. incl. illus. tables, 11 refs.
(Contract NOw 61-0392-d) Unclassified report

DESCRIPTORS: *Heat resistant alloys, *Refractory materials, *Sheets, Propagation, Alloys, Nickel alloys, Iron alloys, Cobalt alloys, Mechanical properties, Molybdenum, Molybdenum alloys, Tungsten, Niobium alloys, Stresses, Deformation, Temperature, High temperature research, Steel, Aging, Titanium alloys, Zirconium alloys, Aluminum alloys, Fracture (Mechanics).

An investigation was made to determine the crack-propagation resistance of super-alloy and refractory-metal sheet materials and to investigate certain aspects of the elevated-temperature mechanical behavior of high-strength low-alloy steels. Sheet specimens containing central transverse fatigue cracks were used in the experimental work. It was found that the fracture toughness of the nickel-base alloys-Rene' 41, Nimonic 90, Inconel-X and Unitemp 1753-decreased slightly in the temperature range from about 1000 to 1400 F, in which temperature range there were generally increases in ultimate tensile strength and decreases in tensile elongation. The alloys A286 (iron-base) and L605 (cobalt-base) did not show this brittleness tendency. Among the refractory metals, unalloyed molybdenum was found to have a brittle-ductile transition temperature of about 150 F; the molybdenum alloys-Mo-1/2%Ti and TZM-both had transition temperatures of about 65 F. Unalloyed tungsten sheet, containing sharp notches rather than fatigue cracks, showed an increasing tendency to brittleness below about 500 F. (Author)

AD-290 305 Div. 17
(TISTM/BRW) OTS price $6.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
MECHANISM OF EVAPORATION OF METAL CRYSTALS.
Final rept.,
by W. H. Robinson. 10 Sep 62, 64p. incl. illus. refs.
(Contract AF 49(638)551) Unclassified report

DESCRIPTORS: *Single crystals, *Silver, Crystal structure, Lattices, Optical analysis, Microscopy, Electron microscopy, Metallic crystals, Evaporation, Shear stresses, Tensile properties, Deformation.

This report includes:
DISLOCATION CONFIGURATIONS IN DEFORMED SILVER SINGLE CRYSTALS, by H. J. Levinstein and W. H. Robinson. 1962.

Ag single crystals oriented for single slip were deformed incrementally in both simple shear and tension, and the dislocation arrangements were observed after each increment of strain by optical examination of the etch pitted surface or by examining replicas of these surfaces by electron microscopy. In addition, some observations were made on specimens deformed in compression. For a given specimen several increments of strain were made during stage I of the deformation and also during stage II. The principal facts which emerged from these observations are that stage I is characterized by slip bands consisting of clusters of dislocations which are cellular in appearance. The segments of these clusters which are straight are very short, probably no more than 1 microns, and a given portion of a dislocation moves only a short distance, of the order of 5 to 10 microns, before being stopped. These results agree with those of transmission electron microscopy of thin foils taken from bulk specimens which have been strained. But they do not agree with observations on thin foils strained in the electron microscope. (Author)

AD-290 336 Div. 17
(TISTM/BRW) OTS price $1.75

Armour Research Foundation, Chicago, Ill.
DIFFUSION IN TITANIUM AND TITANIUM ALLOYS.
Final rept., 1 Nov 60-28 Feb 62 on Metallic Materials,
by Rodney P. Elliott. Oct 62, 57p. incl. illus. tables, 33 refs. (Rept. no. ARF 2208-16)
(Contract AF 33(616)7656, Proj. 7351)
(ASD TDR 62-561) Unclassified report

DESCRIPTORS: *Titanium, *Titanium alloys, Aluminum, Zirconium, Molybdenum, Vanadium, Oxygen, Penetration, Determination, Diffusion.

The self-diffusion of Ti and the interdiffusion of Al, Zr, Mo, V, and O in Ti were investigated in the temperature range 600 to 1300 C. Diffusion couples were prepared by roll-bonding or press-bonding techniques. Electron microprobe methods were used to determine the penetration of the substitutionally dissolved solutes; vacuum fusion analysis was used to determine the penetration of interstitially dissolved O. The electron microprobe analysis could not be used to determine the penetration curves of Al in Ti because of the very high absorption of characteristic Al X-radiation by Ti. The self-diffusion of Ti was investigated by studying penetration of Ti(44), formed by bombarding Sc with protons. Diffusion couples were formed by dissolving Ti(44)-enriched TiO2 into the Ti. (Author)

AD-290 341 Div. 17
(TISTM/BRW) OTS price $2.00

Crucible Steel Co. of America, Pittsburgh, Pa.
DEVELOPMENT OF IMPROVED VANADIUM-BASE ALLOYS FOR ELEVATED-TEMPERATURE USE.
Final rept., 1 May 60-31 Apr 62 on Metallic Materials,
by V. C. Petersen and H. B. Bomberger. Oct 62, 66p. incl. illus. tables, refs.
(Contract AF 33(616)7288, Proj. 7351)
(ASD TDR 62-667) Unclassified report

DESCRIPTORS: *Vanadium alloys, Mechanical properties, High temperature research, Microstructure, Forging, Hardness, Niobium alloys, Titanium alloys, Molybdenum alloys, Carbon alloys, Hafnium alloys, Chromium alloys, Zirconium alloys..

Work was performed to develop V-base alloys

having improved mechanical properties at elevated temperatures. Screening criteria included density-corrected hot hardness at 1800 F and forgeability performance at 2300 F. The hot hardness apparatus that was designed for the program permits loading up to 14 specimens at one time and testing up to 1800 F in vacuum. The validity of hot hardness as a hot strength parameter was established by a correlation with hot-strength data. One hundred seventy-four binary and multi-addition alloys were levitation-melted in 10-gram charges. Microstructure, forgeability, and hot-hardness data on these alloys are presented. Based on a study of the microstructures, forgeability and hot hardness of these alloys, 14 compositions were selected as most promising and were increased to larger melts. Screening data (rollability, hot hardness, and hot-tensile properties) on the larger melts showed the following three compositions to be superior in performance: V-20Cb-5Ti-1Mo-0.1C, V-25Mo-2.5Hf, and V-35Cr-1Zr. These three alloys demonstrated better forgeability and superior 2000 F tensile strength than the well-known V-20Cb-5Ti composition. Iron and tin were also found to be promising alloying elements for further study. (Author)

AD-290 493 Div. 17
(TISTM/BRW) OTS price $3.50

Nuclear Metals, Inc., Cambridge, Mass.
BERYLLIUM RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for 1 Apr 60-30 Sep 61 on Metallic Materials,
by S. H. Gelles. Oct 62, 214p. incl. illus. tables, refs.
(Contract AF 33(616)7065, Proj. 7351)
(ASD TDR 62-509, vol. 1)
Unclassified report

DESCRIPTORS: *Beryllium, Metallurgy, Welding, Surface properties, Preparation, Ultrasonics, Electron microscopy, Beryllium compounds, Iodides, Decomposition, Sheets, Heat treatment.

Effort was directed to making Be more useful as an Air Force structural material. Report describes work in the field of purification, joining and flow and fracture. Volume I describes the preparation of high purity Be by the decomposition of BeI2, the joining of Be by ultrasonic welding and the resistance spot welding of Be. Also, a study of the distribution of BeO and voids in Be by replication electron microscopy, an investigation of the brittle behavior of Be by transmission electron microscopy, and a study of surface damage in Be are described. (Author)

AD-290 607 Div. 17
(TISTM/BRW) OTS price $4.60

Case Inst. of Tech., Cleveland, Ohio.
INTERSTITIAL INDUCED DELAYED FAILURE OF STEEL.
Report on Interrelation Between Structure and Properties of Solids,
by T. E. Scott and A. R. Troiano. Sep 62, 41p. incl. illus. tables.
(Contract AF 33(616)6419, Proj. 7021)
(ARL 62-425) Unclassified report

DESCRIPTORS: *Steel, Hydrogen embrittlement, Fracture (Mechanics), Lattices, Deformation, Hydrogen, Sensitivity, Stresses, Failure (Mechanics).

Similarities in the delayed failure characteristics of hydrogenated high strength steel and a non-hydrogenated high temperature die steel tested at elevated temperatures were evaluated and compared. The almost perfect correspondence of the behavior of the two systems led to the conclusion that the same mechanism was operative in both cases. This mechanism is based on the idea of a local lowering of the cohesive strength of the lattice due to an accumulation of interstitial solute atoms to regions of high elastic strain. A corollary phenomenon, general deterioration, was observed in the high temperature steel as a lowering of the true fracture strength of delayed failure test specimens. The rationalization of this behavior was also based on the above mechanism. (Author)

AD-290 629 Div. 17, 25, 1
(TISTP/JW) OTS price $2.60

Southwest Research Inst., San Antonio, Tex.
STUDIES IN BIAXIAL CREEP.
Final technical rept., 1 Feb 61-31 May 62 on Mechanics of Flight,
by E. Z. Stowell and R. K. Gregory. Sep 62, 15p. incl. illus. tables, 9 refs.
(Contract AF 33(616)7981, Proj. 7063)
(ARL 62-434) Unclassified report

DESCRIPTORS: *Stresses, *Creep, *Metallurgy, Torsion balances, High temperature research, Aluminum alloys, Intensity, Measurement.

Tensile and torsional stresses were applied simultaneously to thin-walled tubes of aluminum alloy at an elevated temperature (400 F). Different identical tubes were subjected to different combinations of tension and torsion, the stresses being so chosen that the combined stress intensity remained substantially constant. Simultaneous measurements were made of the resulting tensile and torsional strains. Each test was continued until the creep had definitely entered the final stage. The measured constant creep rates in the steady state were found to agree closely with those which would be expected from classical plasticity theory using the Mises concepts of stress intensity and strain rate intensity. (Author)

AD-290 630 Div. 17, 26
(TISTM/BRW) OTS price $2.50

Westinghouse Electric Corp., Blairsville, Pa.
THE EXTRUSION, FORGING, ROLLING, AND EVALUATION OF REFRACTORY ALLOYS.
Final rept., 1 Aug 61-1 July 62,
by D. R. Carnahan and J. A. Visconti. Oct 62, 105p. incl. illus. tables.
(Contract AF 33(616)8325, Proj. nos. 7351 and Proj. 7381)
(ASD TDR 62-670) Unclassified report

DESCRIPTORS: *Refractory materials, *Heat resistant alloys, Molybdenum alloys, Tungsten alloys, Zirconium alloys, Titanium alloys, Carbon alloys, Extrusion, Forging, Rolling mills, Microstructure, High temperature research, Mechanical properties, Processing.

Metallurgical studies were conducted on the extrusion, forging, and rolling of arc cast Mo+25%W+0.1%Zr, Mo+0.5%Ti+0.08%Zr+0.02%C and W+0.57%Cb alloys. Each of the three alloys was worked successfully by extrusion and subsequent reworking. The extrusion process, as established in previous work, has remained primarily the same. However, extrusion temperatures exceeding 4200 F were reached in the working of a group of W base alloys. The maximum temperature attained was 4320 F. In addition, the extrusion process was applied to a variety of refractory alloys in order to supply wrought material for

other contractors and governmental agencies. The extrusion data are contained as a portion of the work, but the metallurgical evaluation is not included, as it is accomplished by the particular agency for which the work was performed. (Author)

AD-290 635 Div. 17, 26
(TISTM/BRW) OTS price $2.25

Westinghouse Electric Corp., Blairsville, Pa.
VACUUM ARC MELTING OF A TUNGSTEN ALLOY (TUNGSTEN-MOLYBDENUM-COLUMBIUM).
Final rept., 1 Aug 61-1 July 62,
by George A. Reimann. Oct 62, 74p. incl. illus. tables, 7 refs.
(Contract AF 33(616)7459, Projs. 7351 and 7381)
(ASD TDR 62-781) Unclassified report

DESCRIPTORS: *Tungsten alloys, Molybdenum alloys, Niobium alloys, Vacuum furnaces, Electric arcs, Grains (Metallurgy), Extrusion, Forging, Rolling mills, Crystallization, Microstructure, Melting.

A satisfactory melting technique was established for the production of fine-grained, homogeneous, high quality, W base alloy ingots. The 88W-6Mo-6Cb alloy originally selected for the program was discarded because of ingot cracking and replaced by a 92W-6Mo-2Cb alloy. The redcution of columbium from 6 to 2% permitted the production of sound 3-1/2 inch diameter ingots, 6 to 9 inches in length. Macroexamination revealed a mixture of fine, equiaxed grains and short, thin columnar grains. Seven ingots of the 92-6-2 composition were extruded successfully at 4000 F, using ratios of 4.4:1, 5.7:1, and 7.5:1. The extruded material was forged and rolled to determine workability. A time, temperature, recrystallization study was conducted on forged specimens of the 92-6-2 alloy. (Author)

AD-290 643 Div. 17
(TISTM/BRW) OTS price $1.75

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF FACTORS RELATED TO AN UNKNOWN PHASE IN B120 VCA TITANIUM ALLOY.
Final rept., 15 Apr 61-15 Apr 62 on Metallic Materials,
by David W. Levinson. Oct 62, 62p. incl. illus. tables, 9 refs.
(Contract AF 33(616)8149, Proj. 7351)
(ASD TDR 62-534) Unclassified report

DESCRIPTORS: *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Phase studies, Melting, Welding, X-ray diffraction analysis, Electron microscopy, Electrical conductance, Mechanical properties, Heat treatment.

A study was made of the needle-like precipitate which had been observed to occur in B120 VCA as a result of welding or of solution treating at temperatures above 1100 C. The phase was found to be the alpha phase, stabilized by oxygen. Under conditions of strict oxygen exclusion the alpha needles do not appear. The embrittlement of material aged after either welding or overheating during solution treatment was found to be unaffected by the alpha needles. Embrittlement occurred whether or not needles were present in the microstructure. Some evidence is presented which implies that omega phase precipitation may produce the embrittlement. (Author)

AD-290 655 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF OXYGEN CONTENT ON STRENGTH ON MATERIALS - TITANIUM ALLOY-Ti 6Al-4V,
by A. Giuntoli, P. W. Pergstedt, and H. C. Turner. 12 May 58, 12p. incl. illus. tables, 1 ref. (Rept. no. 8926-057)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Titanium alloys, *Oxygen, Heat treatment, Hydrogen, Elasticity, Deformation, Aluminum alloys, Vanadium alloys, Mechanical properties.

After heat treatment consisting of solution treatment at 1700 F and aging at 1000 F for 3 hours, high oxygen material displayed consistently good mechanical properties up to 500 F, the highest temperature investigated. After heat treatment consisting of solution treatment at 1650 F and aging at 900 F for 6 hours the high oxygen material displayed consistently good mechanical properties up to 650 F, the highest temperature investigated. The oxygen contents of the nominal and high materials were 0.13 and 0.19%, respectively, and their hydrogen contents were 0.0250 and 0.0094%, respectively. The consistently higher ductility of the high oxygen content material was chiefly attributed to its low hydrogen content. (Author)

AD-290 656 Div. 17, 26
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SPOT WELD STRENGTHS ON MATERIAL - ALLOY STEEL - ULTRA-HIGH STRENGTH ''HALMO'' (CRUCIBLE STEEL CO.),
by A. Giuntoli, P. W. Bergstedt, and H. C. Turner. 4 June 58, 9p. incl. illus. tables, 1 ref. (Rept. no. 8926-062)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Steel, *Welding, Alloys, Chromium alloys, Molybdenum alloys, Heat treatment, Mechanical properties, Tensile properties, Resistance, Spot welds.

Resistance spot welds were made with 0.050 inch thick Halmo, a 0.35% carbon, 5% chromium, 5% molybdenum hot-work die steel. After heat treatment consisting of heating at 1950 F for 1 hour, air cooling and double tempering at 1050 F for 2 hours, the materials' mechanical properties were: ultimate strength, 265.5 ksi; yield strength, 225.4 ksi, and elongation, 3% in 2 in. Several sequence combinations of heat treatment and welding were tried to obtain tensile-shear strengths comparable with Mil-W-6858 values for non-hardenable stainless steel, but only welding in the heat treated condition followed by tempering in the spot welding machine was successful in producing weld strengths comparable to those in Mil-W-6858. Under the above welding conditions, average weld strengths of 1918 lbs. in tensile-shear and 234 lbs. in cross-tension were attained. The cross-tension to tension-shear ratio was 0.12. (Author)

AD-290 657 Div. 17
(TISTM/BRW) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SHEAR STRENGTHS ON MATERIALS - ALUMINUM ALLOY -

X2020-T6,
by R. A. Miller and W. H. Steurer. 9 Apr 59, 9p. incl. tables, 1 ref. (Rept. no. 8926-058)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Rivets, Riveted joints, Mechanical properties, Aluminum wire, Heat treatment, Tests, Shear stresses.

Simple shear tests made with 1/8-inch diameter X2020 wire indicated the following shear strengths occurrences in various wire conditions: as received, 25,070 psi; annealed (775 F, 1 hour, slow cool to 500 F), 20,060 psi; solution heat treated (906 F, water quench), 33,350 psi; and solution heat treated and aged (320 F, 12 hours), 54,000 psi. Simple shear tests with solution heat treated and aged rivets revealed 53,500 psi shear strength with rivets aged at 320 F for 24 hours, and 50,400 psi shear strength with rivets aged at 320 F for 12 hours. Lap shear joints made with 0.063- x 1-inch-wide bare 7075-T6 sheet strips, 2 tandem rivets spaced at 1/2 and with 1/4 in. edge distance, rivets aged at 320 F for 18 hours and driven with 1.05 - 1.15 diameter protrusion and 1.30 to 1.40 diameter flat heads, developed 45,417 psi and 47,667 psi ultimate shear strengths with universal and countersunk head rivets, respectively. The X2020-T6 rivets were harder to drive than 7075-T6 rivets and showed a pronounced tendency to develop fine head cracks. (Author)

AD-290 663 Div. 17, 26
(TISTM/TCG) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SEAM WELD STRENGTHS ON MATERIAL - TITANIUM ALLOY - ''COMMERCIALLY PURE'' - EMBOSSED SHEET,
by H. H. Stier, P. W. Bergstedt and H. C. Turner. 16 June 58, 5p. incl. illus. tables (Rept. no. 8926-044)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, *Spot welding, Spot welds, Shear stresses, Welding, Welded joints, Tensile properties.

Randomly oriented, 0.012 in. thick, embossed (Rigidized), commercially pure, Ti alloy sheet stock was seamwelded by the overlapping spot weld method. The average seamweld strength of randomly oriented embossed sheet was 101.6 ksi. The average parent metal strength was 101.8 ksi, and the average joint efficiency was almost 100%. (Author)

AD-290 684 Div. 17, 26
(TISTM/ODN) OTS price $4.00

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF TANTALUM AND ITS ALLOYS.
Final rept., 1 Mar 61-28 Feb 62 on Metallic Materials,
by Frank. F. Schmidt, Albert G. Imgram and others.
Oct 62, 246p. incl. illus. tables, 28 refs.
(Contract AF 33(616)7688, Proj. 7351)
(ASD TDR 62-594) Unclassified report

DESCRIPTORS: *Tantalum, *Tantalum alloys, *Alloys, Manufacturing methods, Heat treatment, Tensile properties, Low temperature research, Oxidation, Stresses, Molybdenum alloys, Tungsten alloys, Rupture, High temperature research, Melting, Hardness, Welding, Deformation, Crystallization, Microstructure, Aging, Elasticity, Preparation, Chemical analysis, Contamination, Physical properties, Mechanical properties.

Fabrication results, bend ductility, tensile properties at low and high temperature, high-temperature stress-rupture data, welding studies, metallurgical studies (both recrystallization behavior and heat treatment), and oxidation behavior of tantalum and tantalum-base alloys are presented. Several tantalum-base alloys were found to have outstanding strength properties at temperatures to 1925 C (3500 F), combined in many cases with excellent room-temperature ductility. Particularly outstanding in this respect are alloys in the system Ta-Mo-W. (Author)

AD-290 691 Div. 17
(TISTM/BRW) OTS price $4.00

Manufacturing Labs., Inc., Cambridge, Mass.
SUBSTRUCTURE AND MECHANICAL PROPERTIES OF REFRACTORY METALS.
Rept. for 1 Apr 61-31 Mar 62 on Metallic Materials,
by B. S. Lement, D. A. Thomas and others.
Oct 62, 269p. incl. illus. tables, 14 refs.
(Contract AF 33(616)6838, Proj. 7351)
(WADD TR 61-181, pt. II)
Unclassified report

DESCRIPTORS: *Refractory materials, *Metals, Tungsten wire, Tungsten, Molybdenum, Tantalum, Niobium, Mechanical properties, X ray diffraction analysis, Electron microscopy, Heat treatment, Deformation, Molybdenum wire, Wire, Sheets, Rods, Microstructure.

Coordinated program on substructural characteristics of W, Mo, Ta and Cb was carried out by ManLabs, MIT, Rutgers, U. Liverpool (Eng.), and U. Cambridge (Eng.) by means of advanced microscopic, x-ray diffraction, and mechanical testing techniques. Initial increase in hardness during recovery of heavily deformed W wire is ascribed to segregation of interstitials to dislocations and to microtwinning. Sharp drop in ductility on 1100C anneal is attributed to rise in transition temperature to above room temperature due to increase in fiber width. Competing processes of polygonization and strain induced fiber boundary migration occur up to 1400C. In Ta single crystals, the maximum principal strain changes from positive to negative on deforming below and above the upper yield point respectively. Binding energy between dislocations and interstitials in Ta is about 0.53 e.v. The activation energy for annealing-out of dislocation loops in Ta and Cb is about 3.0±0.5 e.v. (Author)

AD-290 692 Div. 17, 25
(TISTM/BRW) OTS price $1.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
A NEW THEORY OF WORK HARDENING IN CRYSTALS,
by D. Kuhlmann-Wilsdorf. Sep 62, 14p. 12 refs.
(Contract AF 49(638)435)
Unclassified report

DESCRIPTORS: *Metallic crystals, Hardening, Deformation, Crystals, Theory.

The three stages of the usual work hardening curve of fcc metals, easy glide, stage II, and stage III, are examined theoretically. The manifold and complex observations regarding

easy glide may be understood from the idea that easy glide is the stage during which dislocations move and multiply, spreading throughout the specimen until a quasi-uniform dislocation density, commensurate with the applied stress, has been established. The cause for the amazingly consistent ratio of theta sub II, the work-hardening coefficient during stage II, to G, the modulus of rigidity, such that B/theta sub II = K is about 300 is investigated. Stage II is explained on the basic assumption that multiplication and movements of dislocations take place in such a manner that the dislocation configurations first established change in scale only, but not in character. Stage III is understood to commence at the onset of additional modes of dislocation motion, besides slip, be it climb, or cross slip or both. The dislocation pattern then changes in character. (Author)

AD-290 730 Div. 17, 26
(TISTM/BRW) OTS price $8.10

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF HEAT TREATMENT AND WELDING CHARACTERISTICS OF B-120 VCA TITANIUM ALLOY SHEET, PART II.
Final rept., 16 Dec 61-16 May 62, by John F. Rudy. 30 Aug 62, 75p. incl. illus. table, 8 refs. (Rept. no. ARF 2211-5)
(Contract NOw 61-0351-c)
Unclassified report

DESCRIPTORS: *Titanium alloys, Heat treatment, Welding, Vanadium alloys, Chromium alloys, Aluminum alloys, Tensile properties, Aging, Welds, Sheets, Elasticity, Electron microscopy, Measurement, Microstructure, Mechanical properties.

Studies on heat treatment and welding techniqu were continued in an effort to improve the tensile properties of B-120 VCA in the aged condition. Special welding techniques were not effective in enhancing the aged weld metal tensile properties. Cold rolling after welding provided improved tensile properties in the as-rolled and the rolled and aged conditions, depending on the desired strength. Aging treatments at 800 F provided improved properties, either as the complete isothermal age or as the first stage in a duplex (800 to 1000 F) age. Useful weld metal tensile properties were obtained over a wide strength range, but the weld metal properties are still considerably deficient to those of the base metal. The physical metallurgy of the aging and duplex aging reactions was substantiated indirectly by electron microscopy and elastic modulus measurements. Aging is apparently due to precipitation of omega and alpha phases, and omega disappears in the early stages of post-age annealing (1000 F). (Author)

AD-290 733 Div. 17
(TISTM/BRW) OTS price $5.60

Experimental Inst. of Light Metals, Milan (Italy).
INFLUENCE OF COARSE PERIPHERAL RECRYSTALLIZED GRAIN ON THE TENSILE PROPERTIES AND FATIGUE RESISTANCE OF AlCuMg TYPE 2017-T4 ALLOY EXTRUSIONS.
Final rept., 1 Apr-31 July 62.
31 July 62, 1v. incl. illus. tables, 8 refs.
(Rept. no. 11.515/6207.084)
(Contract DA 91-591-EUC-2241)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Grains (Metallurgy), Tensile properties, Fatigue (Mechanics), Copper alloys, Magnesium alloys, Manganese compounds, Oxides, Extrusion, Crystallization, Heat treatment, Microstructure, Mechanical properties.

The determination of the mechanical characteristics of the extruded bars of 2017-T4 alloy, with a recrystallized cortical zone 2 to 5 mm of thickness, shows that the tensile strength and the yield strength (determined on longitudinal direction) undergo a reduction of about 14.5 and respectively of about 10.5 kg/sq mm when the material loses the press-effect, recrystallizing. The elongation, on the contrary, increases due to the recrystallization process of about 3%. (Author)

AD-290 770 Div. 17
(TISTM/BRW) OTS price $7.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
STRENGTH, EFFICIENCY, AND DESIGN DATA FOR BERYLLIUM STRUCTURES.
Research rept. for Feb 60-Dec 61 on Design Technologies and Structural Configuration Concepts for Aerospace Vehicles.
Feb 62, 1v. incl. illus. tables, refs. (Rept. no. 2-47-61-3)
(Contract AF 33(616)6905, Proj. 1368)
(ASD TR 61-692) Unclassified report

DESCRIPTORS: *Beryllium, Structures, Mechanical properties, Stresses, Design, Data, Forging, Extrusion, Sheets, Buckling, Metal joints, Manufacturing methods, Machining, Lathes, Rolling mills, Drilling machines, Beams, Box beams, Cylindrical bodies.

Studies were made to investigate the design capabilities of beryllium as a structural material and to derive and develop structural design curves and related data for efficient structural design with beryllium. The metal beryllium is believed to have high potential for aerospace structures, but is not extensively considered in design applications because of uncertainties as to the proper design procedures. This report presents information based on studies and tests which clearly shows that beryllium now may be designed with confidence into many types of load-carrying structures, using well-known methods of structural analysis and appropriate margins of safety. The resulting beryllium structures are shown to be considerably lighter than identical structures fabricated from other metals, and these structures are attainable with currently available beryllium mill products. (Author)

AD-290 830 Div. 17, 25
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERNAL FRICTION OF TUNGSTEN,
by L. N. Aleksandrov. 22 Oct 62, 6p. incl. illus. 11 refs. (Trans. no. FTD-TT-62-1319 from Fizika Metallov i Metallovedeniye 13, 4:pp. 636-639, 1962)
Unclassified report

DESCRIPTORS: *Tungsten alloys, Tungsten wire, Measurement, Test methods, Translations, USSR, Internal friction.

An investigation was made of the temperature dependence of relaxation, internal friction, and modulus of elasticity in shear g in a tungsten VA-3 wire after recrystallization annealing. The investigated wire with silicon-alkali admixture was obtained by sintering with subsequent forging and extraction to a diameter of 0.2 mm.

Content of admixtures (weight %): Al2O3-0.001; Fe2O3 - 0.004; SiO2 - 0.043; Mo - 0.005. Internal friction was measured on a torsion pendulum. (Author)

AD-290 834 Div. 17
(TISTM/BRW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METALLOGRAPHY AND THE HEAT TREATMENT OF METALS (SELECTED ARTICLES).
24 Oct 62, 27p. incl. illus. tables, 10 refs.
(Trans. no. FTD-TT-62-1245 from Metallovedeniye I Termicheskaya Obrabotka Metallov 11:pp. 25-33, 36-40, 1961)
Unclassified report

DESCRIPTORS: *Metals, Heat treatment, Steel, Stainless steel, Translations, USSR, Metallurgy.

Contents:
The replacement of nickel by manganese and nitrogen in stainless steels
Kh 17N4G9 (E1878) steel, a substitute for steels of the 1Kh18N9 and 1Kh18N9T type
Helical springs fabricated from 3 Kh13 steel

AD-291 155 Div. 17
(TISTM/ODN) OTS price $3.60

New York U., N. Y.
INVESTIGATION OF CREEP BUCKLING OF COLUMNS AND PLATES. PART I. ELEVATED TEMPERATURE PROPERTIES OF THE TEST MATERIAL Ti-7Al-4Mo TITANIUM ALLOY.
Rept. for June 58-May 59 on Materials Analysis and Evaluation Techniques,
by Ralph Papirno and George Gerard. Nov 59, 27p. incl. illus. tables, 3 refs.
(Contract AF 33(616)5807, Proj. 7360)
(WADC TR 59-416, pt. 1) Unclassified report

DESCRIPTORS: *Alloys, *Titanium alloys, Aluminum alloys, Molybdenum alloys, Heat treatment, Elasticity, Stresses, Mechanical properties, Tensile properties, Buckling, Tests, Creep.

As a first phase of an investigation of the creep buckling of columns and plates, materials properties tests were conducted on the test material Ti-7Al-4Mo Ti alloy in both as received annealed and heat treated conditions. Bulk specimen material was heat treated according to the following schedule to obtain optimum creep performance: 1450 F-1 hr., furnace cool to 1050 F, air cool; reheat to 1050 F-24 hr., air cool. This phase of the investigation was necessary because of the paucity of published materials property data on this alloy, especially in compression. A new technique for the collection of compression creep data from sheet specimens was developed in which both the short time stress-strain properties prior to creep and the creep data itself are autographically recorded. The test results include values of the modulus of elasticity and 0.2% yield strength in both tension and compression at room temperature, 750 F, 850 F and 950 F. Compressive creep data were collected for a number of stress levels at 850 F and 950 F. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-290 237 Div. 18
(TISTB/LMH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
NOTES ON NON-MILITARY MEASURES IN CONTROL OF INSURGENCY,
by Guy J. Pauker. Oct 62, 12p. (Rept. no. P-2642)
Unclassified report

DESCRIPTORS: *National defense, *Riot control, Philippine Islands, Malaya, Vietnam, Economic conditions, Population, War potential, Foreign policy, Probability.

A preliminary look is presented of non-military measures taken in countering insurgencies in the Philippines, Malaya and South Vietnam. (Author)

AD-290 254 Div. 18
(TISTW/RD) OTS price $3.60

Hughes Aircraft Co., Fullerton, Calif.
COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM PHASE II DEVELOPMENT, FABRICATION, AND TEST.
Bi-monthly technical progress rept. no. 4, 1 Sep-31 Oct 62,
by J. Glaser. 20 Nov 62, 39p. incl. illus. tables (GSG rept. no. 1183.00/35, FR 62-11-128)
(Contract DA 18-108-cml-6618)
Unclassified report

DESCRIPTORS: *Antiaircraft defense systems, *Combat information centers, Air intake filters, Shelters (Protective equipment), Particulate filters.

AD-290 471 Div. 18
(TISTB/MD) OTS price $4.60

Quartermaster Food and Container Ins. for the Armed Forces, Chicago, Ill.
DESIGN OF LOAD CONFIGURATIONS FOR THE M-4A HIGH SPEED AERIAL DELIVERY CONTAINER XII. LOAD CONFIGURATIONS FOR PRACTICE HAND GRENADES AND 30-CALIBER BROWNING MACHINE GUNS WITH ASSOCIATED AMMUNITION.
Interim rept.,
by Edward J. Pulo. Oct 62, 44p. incl. illus. tables (QMFCIAF rept. no. 36-62; Technical rept. no. 238)
(Proj. 7-87-03-004) Unclassified report

DESCRIPTORS: *Air drop operations, *Containers, Grenades, Training ammunition, Automatic weapons, Small arms, Small arms ammunition, Grenade fuzes, Impact shock, Tests, Ammunition, Airborne.

Three load configurations were designed to fit into the cargo compartment of a M-4A high speed aerial delivery container. One load configuration consisted of three wooden shipping containers each packed with Grenades, Hand, Practice, M-21, with fuse, M205A1, (Spec. Mil-G-10648a). A second load configuration consisted of sealed canisters containing the same type of grenades in their individual M41A1 containers. The third load configuration consisted of three Caliber 30, Browning Machine Guns, M1919A6, W/E and 11 simulated cases of 30-caliber ammunition. Factors considered in the designs were resistance to damage, space utilization, ease of loading, and ease of distribution. Velocity at impact for each of the three load configurations was approximately 35 feet per second. Additional cushion-

ing permitted an impact velocity of approximately 50 feet per second for the hand grenade load configuration of three wooden boxes. In all instances no significant damage was noted. (Author)

AD-290 532 Div. 18
(TISTB/MD) OTS price $1.10

RAND Corp., Santa Monica, Calif.
SOUTHERN CALIFORNIA IN A THERMONUCLEAR WAR,
by Harold L. Brode. Nov 62, 10p. (Rept. no. P-2665)
Unclassified report

DESCRIPTORS: *Shelters, *Survival, *Nuclear warfare, California, Civilian Defense Systems, Nuclear explosions.

AD-290 921 Div. 18
(TISTE/OHD) OTS price $2.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
A LANCHESTER-TYPE MODEL FOR COMBAT BETWEEN SUBMARINES, CARRIER TASK GROUPS, AND HUNTER-KILLER GROUPS.
Interim rept.,
by Joseph Bram. 28 Aug 62, 24p. incl. tables, 4 refs. (Interim research memo. no. IRM-22)
Unclassified report

DESCRIPTORS: *Naval operations, *Antisubmarine warfare, *Simulation, *Mathematical analysis, Lanchester equations, Naval battles, Aircraft carriers, Probability, Programming, Statistical analysis, Statistical distributions, Digital computers.

The use of a Lanchester combat mathematical model of a case in which two naval forces are engaging in a large ocean arena is explored. Specifically, carriers protected by ASW screens are in the area attempting to accomplish a mission. They are opposed by submarines which must seek and attack the carriers, and they are supported by huk groups which roam the area hunting submarines. First to be discussed is a digital computer approach for calculating the survival probabilities of the various combinations of carriers and submarines, as functions of time. Then an approximate analytic expression is derived for the expected fraction of the carrier force remaining afloat as a function of time. This approximation, and another previously derived from 'expected value' analysis of this problem are compared to the machine generated values. The approximation is substantially better than earlier efforts, especially in certain critical cases. (Author)

AD-291 085 Div. 18, 16
(TISTB/MD) OTS price $2.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON BIOLOGICAL WARFARE, JULY 1953 AND SUPPLEMENT, JUNE 1957.
5 June 57, 37p.
Unclassified report

DESCRIPTORS: *Bibliography, *Biological warfare, Public opinion, Preventive medicine.

AD-291 142 Div. 18
(TISTB/DGH) OTS price $8.10

Stanford Research Inst., Menlo, Park, Calif.
THE POSSIBLE UTILITY OF THE U.S. OVERSEAS BASE STRUCTURE,
by Harold W. Rood. Sep 62, 80p. refs. (Technical rept. no. 34)
(Contract DA 04-200-506-ORD-710)
Unclassified report

DESCRIPTORS: *National defense, *Military facilities, Effectiveness, Feasibility studies, Armed forces.

This is a study of the political, economic, and military uses of an overseas base system for the support of a national policy of flexible response. The paper includes a resume of the role played by American overseas bases in the past, a summary of conceivable uses of overseas bases at various levels of conflict, and recommendations for further research to explore the possible development of an overseas base system for the future. (Author)

AD-291 191 Div. 18
(TISTW/RD) OTS price $2.60

RAND Corp., Santa Monica, Calif.
COMMAND AND CONTROL--A GLANCE AT THE FUTURE,
by N. C. Dalkey. Nov 62, 20p. incl. illus. (Rept. no. P-2675)
Unclassified report

Prepared for presentation at the First Congress on the Information System Sciences of the Air Force Electronic Systems Div. and the MITRE Corp. 20 Nov 62, Hot Springs, Va.

DESCRIPTORS: *Command systems, *Control systems, *Mathematical prediction, *Scheduling, Military operations.

19. NAVIGATION

AD-290 396 Div. 19
(TISTA/GEC) OTS price $5.60

General Precision, Inc., Little Falls, N. J.
STINGS.
Monthly letter rept. no. 4 for Feb 62.
Feb 62, 54p. incl. illus. tables (Document no. 10304)
(Contract AF 04(694)119)
Unclassified report

DESCRIPTORS: *Inertial navigation, Star trackers, Ground support equipment, Research program administration, Costs, Controlled atmospheres, Test, Inertial guidance.

AD-290 683 Div. 19
(TISTW/RD) OTS price $2.60

Federal Aviation Agency, Washington, D. C.
COST ANALYSIS OF THE ASR 4 TERMINAL AREA RADAR.
Nov 62, 21p. incl. illus. table.
Unclassified report

DESCRIPTORS: *Airport radar systems, *Air traffic control systems, *Ground controlled approach radar, Aircraft, Detection, Plan position indicators, Costs, Radar equipment.

This report was prepared to support an SRDS requirement for ''in service improvement'' of the ATS Approach and Departure Control service. The report contains cost data on the establishment, maintenance and operation of the ASR 4 radar system. The information is broken out by major equipment components. Photographs of the equipment and functional descriptions are also presented. (Author)

AD-291 130 Div. 19, 12
(TISTA/SEB) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
STUDY OF ELECTROMAGNETIC TECHNIQUES FOR SPACE NAVIGATION.
Quarterly progress rept. no. 11, 16 Aug-15 Nov 62, by R. G. Franklin and R. H. Field. 15 Nov 62, 20p. incl. illus. (Rept. no. Q-A2415-11)
(Contract AF 33(616)7244, Proj. 0(610)4427)
Unclassified report

DESCRIPTORS: *Space navigation, *Celestial navigation, Stars, Spectrographic cameras, Spectrographic analysis, Sun, Telescopes, Instrumentation, Electromagnetic waves, Calibration, Space flight.

The stellar spectrograph was assembled and aligned. A brief description of the mechanical construction and of the alignment procedures is given. Figures illustrate the various parts of the instrument. (Author)

AD-291 152 Div. 19, 1
(TISTW/RD) OTS price $1.60

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
REPORT ON REDESIGN OF NAVIGATION SET, LOW ALTITUDE A/A-37G-2,
by Charles W. Olson. 1 Nov 62, 5p. incl. illus. table (Rept. no. NADC-AI-6274)
Unclassified report

DESCRIPTORS: *Flight instruments, *Navigation, Attack bombers, Jet bombers, Naval aircraft, Airborne.

Modifications made to the NSLA A/A-37G-2 equipment for a reduction in size, incorporation of electroluminescence to improve night lighting of map area and elimination of the sprocket type of map drive, permitting use of unperforated aeronautical strip charts are described.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-289 692 Div. 20
(TISTE/OHD) OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
THE DEVELOPMENT OF THE SILICON-JUNCTION FAST-NEUTRON DOSIMETER FOR APPLICATION IN THE RADIATION-EFFECTS TESTING RANGE.
Final summary rept., 1 June 61-30 Sep 62, by O. J. Mengali, W. H. Closser, and H. C. Gorton. 30 Sep 62, 32p. incl. illus. tables, 6 refs.
(Contract DA 18-108-405-cml-1031)
Unclassified report

DESCRIPTORS: *Dosimeters, *Fast neutrons, *Neutron detectors, Silicon, Zone melting, Surface properties, Semiconductors, Nuclear reactions, Radiation instruments, Diffusion, Chemical milling, Solid state physics, Radiation effects.

Experimental silicon-junction fast-neutron dosimeters were prepared with crystal type, base width, surface work damage, and a process modification to increase initial charge-carrier lifetime as variable parameters. Examination of the preirradiation characteristics of the devices revealed several unexpected effects related to the material and process variables. To accurately determine the neutron exposure of the experimental dosimeters, a complete independent calibration was made of the flux spectrum of the reactor at the core position used in the irradiations. Six fission foils and threshold detectors with threshold energies from 4 kev to 6.9 mev were used. In115 foils and S32 pellets were included with the experimental dosimeters in each of the irradiations. The narrower base devices were shown to be much less sensitive to fast-neutron irradiation than the wider base devices. Although the sensitivity of the device to irradiation was not linear, the nonlinearity was generally less than 20% from 10 to the 12th power to at least 10 to the 13th power nvt. It was observed that neither surface treatment nor lifetime retention process had a significant effect on the sensitivity of the devices. (Author)

AD-289 826 Div. 20, 25
(TISTP/WH) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
RECENT ADVANCES IN THE USE OF THE ELECTRON SPECTROMETER,
by Edwin N. Lassettre, Frederic M. Glaser and others. Sep 62, 22p. incl. illus. tables, 19 refs. (Scientific rept. no. 4)
(Contract AF 19(604)4541, Proj. 7635)
(AFCRL 62-1070) Unclassified report

DESCRIPTORS: *Electron beams, *Scattering, *Carbon dioxide, *Helium, *Nitrogen, *Spectrographic analysis, *Electron guns, Gases, Stability.

The stability, resolution and electron beam current of the electron spectrometer in use have been increased. This has been accomplished by heating the entrance and exit slits of the velocity analyzer used for velocity selection before scattering and by substituting a short slit (width is half the diameter of the pinhole) for the exit pinhole and entrance slit of the velocity analyzer. Excitation potentials and the relative intensities of peaks obtained by electron impact are discussed briefly and compared with optical data. Electron impact spectra of helium, nitrogen, nitric oxide, and carbon dioxide are included. (Author)

AD-289 844 Div. 20
(TISTM/EJH) OTS price $3.60

Washington U., St. Louis, Mo.
RESONANCE ABSORPTION OF GAMMA-RAYS IN NORMAL AND SUPERCONDUCTING TIN,
by M. Yaqub and C. Hohenemser. 1962, 24p. illus. tables, 19 refs.
(Contract AF 49(638)843)
Unclassified report

DESCRIPTORS: *Resonance absorption, *Tin, *Superconductors, Isotopes, Gamma rays, Phonons, Photons, Deuteron bombardment.

A study of the resonant absorption of the 23.8 KeV gamma-rays in Sn-119 was made between 373 and 1.1 K by using the Sb-119 K-capture parent. The source was prepared by bombarding natural Sn with 10 MeV deuterons in a cyclotron, and was thick enough to absorb resonantly a large portion of the recoilless photons emitted. By studying the self-absorption in this source between 373 and 60 K and taking into account the contributions to the intensity due to resonant scattering, an average value of the Debye temperature, theta, was derived. In order to see if the phonon spectrum undergoes a change in passing

from the superconducting to the normal phase, the counting rate was measured at several temperatures between 4.2 and 1.1 K, with and without a magnetic field strong enough to destroy the superconductivity of the source. Using the derived value of 140 K for theta, it was concluded that the change in theta between the two phases could not be more than 0.76 K. (Author)

AD-289 869 Div. 20
(TISTP/FR) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
A PORTABLE COMBINATION DOSE-DOSERATE METER,
by R. L. Hopton. 1 Oct 62, 25p. incl. illus. 5 refs. (Rept. no. NRDL TR 586)
Unclassified report

DESCRIPTORS: *Gamma counters, *Dosimeters, Detectors, Oscillators, Pulse counters, Power supplies.

A battery-operated portable combination rate-meter-dosimeter was developed which will measure gamma radiation rate from 0-1000 r/hr in three linear decade ranges. Simultaneously, the integrated dose may be read from a digital display whose range is 0-999.9 r. The least count on the digital register is 0.1 r. The rate may be read with an accuracy of less than ±10 percent between -40 and +50 C. The integrated dose from Co^{60} isotope may be read to 0.1 r or ±10 percent, whichever is greater, from -40 to +50 C. Battery life, using two C size nickel-cadmium rechargeable cells is in excess of 40 hr per charge. Package weight, including battery, is less than 3 lb, and size is 4 by 4 by 7 in. (Author)

AD-290 358 Div. 20
(TISTP/JW) OTS price $13.50

Nuclear Defense Lab., Army Chemical Center, Md.
COLD WEATHER DECONTAMINATION STUDY - McCOY II. Final rept.,
by Joseph C. Maloney, John L. Meredith and others.
July 62, 199p. incl. illus. tables, 5 refs.
(Rept. no. NDL-TR-32)
Unclassified report

DESCRIPTORS: *Decontamination, *Low temperature research, Climatic factors, Radiation effects, Simulation, Surfaces.

Experiments were conducted to collate data pertinent to radiological decontamination under cold-weather conditions. A series of fallout decontamination tests was conducted in the temperature range of -10 to +32 F at Camp McCoy, Wisconsin, on appropriate winter surfaces using maintenance, snow-removal, and fire-fighting equipment. Following this, a contingent of 24 troops decontaminated a 3 1/2-acre living quarters complex as a logistic exercise. Tests were also conducted on the migration of fallout deposited on ice and snow, and the shielding effects of ice and snow cover. Proper weather conditions were experienced at the test site and the following findings were made: (1) Decontamination of hard surfaces by sweeping and hosing under cold weather conditions were of comparable effectiveness to temperate weather conditions. (2) Decontamination of snow required removal by plowing, grading, scraping, or hosing. Packed snow could also be swept effectively. (3) Roofs were best decontaminated by sweeping with brooms. The use of fire hoses was of marginal effectiveness. (4) A 3 1/2-acre living quarters complex can be decontaminated 80% by a 24-man team which would receive less than a 5 r dose after a two-week waiting period under the fallout conditions of 2000 r/hr at H+1. (5) Migration of fallout in ice and snow was restricted to a few inches vertically and a few feet horizontally under the weather conditions experienced at the site. (Author)

AD-290 544 Div. 20
(TISTP/WH) OTS price $2.60

Naval Research Lab., Washington, D. C.
INTERCALIBRATION OF SOME SYSTEMS EMPLOYED IN MONITORING FISSION PRODUCTS IN THE ATMOSPHERE. Interim rept.,
by L. B. Lockhart, Jr. and R. L. Patterson, Jr.
13 Nov 62, 23p. incl. illus. tables, 5 refs.
(NRL rept. no. 5850)
Unclassified report

DESCRIPTORS: *Fission products, *Radioactive fall-out, Calibration, Monitors.

A study was made of some of the systems involved in measuring the concentrations of fission products in the air at ground level and a direct comparison made of radioactivity results reported from each of the systems on replicate samples made at the same time and place over an extended period. Some information on the filtration characteristics of the various filter media is also included. The experimentally determined relative radioactivity concentrations of identical air samples from which interconversion factors can be derived for directly comparing any of the systems with another are as follows: NRL air monitor, 1.00; U.S. Public Health Service Radiation Surveillance Network, 1.17; Canadian Air Monitoring Network, 1.82; NRL 80th Meridian Network, 2.07. These ratios are based on the sampling of a known volume of air; there is presently some degree of uncertainty as to the actual volume of air sampled at the various field sites of the three operating networks. (Author)

AD-290 590 Div. 20, 15
(TISTP/WH) OTS price $1.10

Columbia U., New York.
AN APPROXIMATION IN PROBLEMS OF WAVE PROPAGATION IN COMPLEX VISCOELASTIC MEDIA,
by W. R. Spillers and H. H. Bleich. Oct 62, 6p. illus. 5 refs. (Technical rept. no. 13; Rept. no. CU 2-62)
(Contract Nonr-26634, Proj. NR 064-417)
Unclassified report

DESCRIPTORS: *Elasticity, *Viscosity, *Solids, *Wave transmission, *Rods, Numerical methods and procedures, Integral transforms, Functions, Curve fitting.

An exponential interpolation was proposed as an approximation in viscoelastic wave propagation problems (Tech. rept. 10, CV-2-60 ONR-266; Mitre Corp., REP-SR-22). The above papers were limited to the consideration of materials having only one typical time constant like the standard solid. The idea of this exponential interpolation is extended to materials which have a more complex response, containing two or more time constants. (Author)

AD-290 624 Div. 20, 25
(TISTP/JW) OTS price $4.60

University Coll., London (Gt. Brit.).
PION-PION INTERACTIONS IN THE STATES T EQUALS

O AND T EQUALS 1,
by T. D. Spearman. 29 Aug 62, 43p. incl. illus. tables, 24 refs. (Technical note no. 9)
(Grant AF EOAR 62-3)
Unclassified report

DESCRIPTORS: *Pions, *Nuclear fluorescent scattering, Energy, Scattering, Resonance, Mesons, Phase shifters.

New dispersion relations are derived for the s-wave pion-nucleon scattering amplitudes. These relations are specifically chosen to facilitate the task of separating the two-pion exchange term from the other effects contributing to low energy pion-nucleon scattering. In these equations the contribution from the unknown short range terms is markedly suppressed, a greater emphasis is placed on the experimentally better established very low energy pion-nucleon data, (in particular, on the scattering lengths), and in the contribution of the two-pion exchange term, the lower energies are more heavily stressed. The terms due to the two-pion exchange, which we isolate, are very clearly recognized by their characteristic energy dependences. The two-pion exchange terms are analyzed in terms of the interaction between the two pions. The values obtained for these terms are made to yield information about the phase-shifts for pion-pion scattering in the T=1 and T=0 states. In the T=1 state the data are well fitted with a narrow resonance in the pion-pion system at 750 Mev. Taking the results of electron-nucleon scattering experiments in conjunction with the present data, the half-width of this resonance is found to lie between 40 and 60 Mev, in agreement with the experimental data for the observed P-meson. (Author)

AD-290 625 Div. 20, 25
(TISTP/JW) OTS price $1.60

University Coll., London (Gt. Brit.).
ON THE Δ e_3 DECAY.
by L. Egardt. 29 Aug 62, 12p. illus. 15 refs.
(Technical note no. 8)
(Grant AF EOAR 62-3)
Unclassified report

DESCRIPTORS: *Hyperons, *Deterioration, Protons, Tensor analysis, Spectrographic analysis.

Expressions for the proton spectrum are obtained under the assumption of a current-current interaction and for a scalar and tensor interaction. If the ''induced'' form factors are neglected and the V-A form factors are assumed to be constant the spectrum yields useful information about the relative strength of the vector and axial vector current. (Author)

AD-290 674 Div. 20
(TISTP/TL) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
MOLECULAR-SIZED CHANNELS AND FLOWS AGAINST THE GRADIENT,
by George B. Dantzig. 1 Oct 62, 11p. incl. illus.
(Research rept. no. 31)
(Contract Nonr-365602)
Unclassified report

DESCRIPTORS: *Statistical processes, *Probability, *Particles, *Fluid flow, *Nuclear physics, Impact shock, Matrix algebra, Sequences, Operations research.

If a passage is so narrow that species must line up in it in single file, then a Markov-type process can take place in which several species considered together would have an average flow from their high to low total concentration, but some subset of the species could have an average flow against their individual gradients. Hodkin and Keynes (J. Physiol., Vol.128, 1955) proposed this type of model to explain observed exchange rates of potassium and its labelled isotope across the membrane of a living cell. We extend this approach by assuming that there are particles of different types (e.g., Na+, K+ H20) which complete for entry into a passage. (Author)

AD-290 701 Div. 20
(TISTP/WH) OTS price $1.10

Oxford U. (Gt. Brit.).
RESEARCH ON INELASTIC PROCESSES.
Summary technical note,
by J. R. Rook and D. Mitra. 1962, 10p. 1 ref.
(Contract AF 61(052)455)
Unclassified report

DESCRIPTORS: *Nuclear physics, *Inelastic scattering, *Mesons, *Stripped atoms, *Nuclear forces.

Work performed for the year 1961-2 is summarized. The topics covered are K mesic atoms, double nuclear stripping, compound nucleus theory and the application of the pairing force model.

AD-290 815 Div. 20
(TISTE/OHD) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DEVICE FOR TRACING RADIOACTIVE CONTAMINATION.
15 Nov 62, 1p. (AID rept. no. 62-182; Trans. from Shcherbakov, V. Special ruler for plotting the areas of radioactive contamination. IN: Voyennyy Vestnik, no. 9:p. 116, 1962)
Unclassified report

DESCRIPTORS: *Radioactive fall-out, *Computers, Mapping, Maps, Nuclear explosions.

Using a special ruler, together with reference data, it is possible to plot on the map the area of radioactive fallout from an above-ground nuclear explosion. The ruler is simple and easy to handle, reduces the time required to evaluate the radioactive conditions, and assures accuracy of calculations. (Author)

AD-290 824 Div. 20
(TISTP/WH) OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STRIKING EFFECT OF NUCLEAR EXPLOSION,
by A. I. Ivanov and G. I. Rybkin. 12 Sep 62, 354p. incl. illus. tables (Trans. no. FTD-TT-61-396 from Voyennoye Izdatel' stvo Ministerstva Oborony Soyuza SSR - Moskva, 1960)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Radioactive fall-out, *Radiation effects, *Radiological dosage, *Thermal radiation, *Gamma rays, *Beta particles, *Alpha particles, *Shelters, USSR.

The book ''The Damaging Effect of Nuclear Explosions'' is based on material published in the foreign press. It gives a description of the striking power of nuclear weapons. The authors acquaint readers with methods of protection against nuclear weapons. The book contains a detailed and comprehensible explanation of the

physical bases of atomic and thermonuclear munitions and considers the various damaging factors and simplest methods of calculating the area of the contaminated zone. The principal matter contained in the book is intended for an extensive circle of readers - servicemen in the Soviet army and navy and also members of the DOSAAF (Voluntary Armed Forces Organization) acquainted with the fundamentals of physics and mathematics. A small section of the book may interest military and signal specialists who have received greater training in the field. When reading the book the less specialized reader may leave aside the complex problems without fear of not understanding the book as a whole. (Author)

AD-291 045 Div. 20
(TISTP/TL) OTS price $4.60

Ballistic Research Lab., Aberdeen Proving Ground, Md.
A COMPLETE SET OF FUNCTIONS FOR DESCRIBING THE ANGULAR DISTRIBUTION OF THE NEUTRON FLUX FROM A POINT SOURCE IN AIR,
by R. H. Peterson and J. A. Williams. Sep 62, 52p. incl. illus. tables, 9 refs. (BRL Memo. rept. no. 1432)
(Proj. 5N 98-01-004)
Unclassified report

DESCRIPTORS: *Neutron flux density, *Nuclear explosion, *Functions, *Numerical methods and procedures, *Polynomials, Series, Air, Tables, Least square method, Harmonic analysis, Special functions.

Based on the properties of Jacobi polynomials, a set of functions $g_n^m(\cos\theta)\cos m\phi$ which is complete over a unit sphere are developed. They differ from the spherical harmonics $P_n^m(\cos\theta)\cos m\phi$ in that the zonal terms $g_n^o(\cos\theta)$ contain singularities of order $(1-\cos\theta)^{-1/2}$ at $\theta=0^o$ and are finite elsewhere thus providing a rapidly converging series for the observed peakedness of the angular distributions of neutron fluxes from a point source in air. Tables of the function $g_n^m(\cos\theta)$ as well as its integral and its adjoint for $0\leq m\leq n$ and $0\leq n\leq 4$ are included. (Author)

AD-291 133 Div. 20, 14
(TISTM/TCG) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
SOME APPLICATIONS OF A SEMIEMPIRICAL FORMULA FOR DIFFERENTIAL DOSE ALBEDO FOR GAMMA RAYS ON CONCRETE,
by W. C. Ingold. 30 Nov 62, 23p. incl. illus. tables, 4 refs. (Rept. no. TN-469)
Unclassified report

DESCRIPTORS: *Gamma rays, *Concrete, *Shielding, *Differential equations, Mathematical analysis, Theory, Radioactivity, Dose rate, Scattering, Reflection, Ducts, Cylindrical bodies.

This theoretical study illustrates the usefulness and versitility of a semiempirical formula through its application to three specific problems: (1) In generating a table of albedo values for various combinations of angles of scatter; (2) In a study of first reflection contribution to dose rate in a round duct compared to that in a square duct; and (3) In the development of a relatively simple and unsophisticated program for multiple scatter contributions. (Author)

AD-291 134 Div. 20
(TISTP/WH) OTS price $1.10

Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RAYS OF In115,
by J. P. Hurley, R. M. Brown and C. E. Mandeville. 26 Oct 62, 13p. incl. illus. 5 refs. (Rept. no. NRDL-TR-593)
Unclassified report

DESCRIPTORS: *Gamma ray spectra, *Indium, *Radioactive decay, Gamma rays, Nuclear shell models, Radioactive isotopes.

The gamma-ray spectrum of In-115 has been investigated with a scintillation spectrometer. The 1.14 MeV gamma ray is found to be emitted in (0.081 + or - 0.016) percent of the disintegrations and the gamma ray at 1.41 MeV in (0.035 + or - 0.007) percent of the disintegrations. The results are interpreted as showing evidence of the presence of at least two levels in the vicinity of 1.4 MeV in the level scheme of In115. (Author)

AD-291 140 Div. 20
(TISTA/WH) OTS price $1.60

General Electric Co., Schenectady, N. Y.
HIGH-ENERGY NUCLEAR PHYSICS RESEARCH PROGRAM. Final rept.,
by W. B. Jones. Jan 60, 7p. 19 refs. (Rept. no. 60-RL-2345 E)
(Contract N7onr-33201)
Unclassified report

DESCRIPTORS: *Synchrotrons, *Betatrons, *Nuclear reactions, *Collimators, *Cerenkov radiation.

A 300-Mev nonferromagnetic synchrotron was developed, and a program of research in high-energy physics was carried out in connection with the 300-Mev synchrotron and the 100-Mev GE betatron. These activities are reviewed briefly. (Author)

AD-291 141 Div. 20, 30
(TISTP/WH) OTS price $8.60

General Electric Co., Santa Barbara, Calif.
A 7090 CODE FOR THE CALCULATION OF ELECTROMAGNETIC BLACKOUT FOLLOWING A HIGH ALTITUDE NUCLEAR DETONATION,
by P. G. Fischer, R. W. Hendrick, Jr. and R. H. Christian. 29 Dec 61, 93p. incl. illus. tables. (Rept. no. RM 61 TMP-96)
(Contract DA 49-146-XZ-038)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Electromagnetic waves, *Ionosphere, *Electrons, *Radio interference, *Programming, *Digital computers, High altitude, Absorption, Density.

This program computes the electron concentration and resulting electromagnetic absorption, as functions of time, altitude, and range, for specified detonation and debris histories. The computation includes initial ionization due to x-rays, gamma rays, neutrons and debris, as well as delayed ionization due to the continuing beta and gamma radiation from the debris. It computes the transient recombination and quasi-equilibrium solutions for electron concentration and the incremental E. M. wave absorption (decibels/kilometer) at the required altitudes for up to three specified E. M. wave frequencies. From these, the altitudes of specific electron concentration contours are interpolated and the one-way vertical absorption is obtained by trapezoidal integration. (Author)

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

AD-291 157 Div. 20
(TISTP/WH) OTS price $1.10

California U., Berkeley.
(No title).
Final rept., 1 July 60-30 Sep 62,
by R. R. Brown. Nov 62, 6p.
(Contract AF 49(638)873)
(AFOSR-419) Unclassified report

DESCRIPTORS: *Atmospheric sounding, *Aurorae, *Cosmic rays, *Protons, *Electron bombardment, Balloons.

Activities were directed toward exploring radiation effects at balloon altitudes in the auroral zone. This location offers the best opportunity for obtaining information on particle bombardment of the atmosphere resulting from solar activity. Thus, solar proton events as well as electron events associated with the aurora and magnetic disturbances are often found in this region. (Author)

AD-291 159 Div. 20, 25
(TISTP/WH) OTS price $1.60

Sandia Lab., Albuquerque, N. Mex.
SUMMARY OF SHERWOOD ACTIVITIES,
by Daniel J. Myers. 15 Aug 62, 111p. incl. illus. (Rept. no. NP-12171)
Unclassified report

DESCRIPTORS: *Thermonuclear reactions, *Deuterium, *Tritium, *Magnetic pinch, *Plasma physics, *Magnetohydrodynamics, *Magnetic fields, *High temperature research, *Ions.

SHERWOOD is the code name applied to the program designed to obtain controlled thermonuclear reactions. The goal of the project is to evolve an economically feasible power reactor using either a deuterium-deuterium (D-D) or a deuterium-tritium (D-T) reaction and capable of regenerating as much tritium as it consumes. The immediate goal at the various laboratories is to produce an experimental device which will prove the feasibility of such a reactor; that is, to obtain a controlled thermonuclear reaction in which the energy output is greater than the energy expended in initiating and maintaining the reaction. (Author)

AD-291 180 Div. 20, 4
(TISTM/TCG) OTS price $1.60

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Quarterly technical progress rept. no. 11, 8 June-8 Sep 62,
by R. A. Karam, T. F. Parkinson and M. F. Panczyk. 8 Sep 62, 13p. illus. 9 refs.
(Contract NOa(s) 60-6021-c)
Unclassified report

DESCRIPTORS: *Rhenium, *Radioactive isotopes, *Radioactive decay, *Nuclear shell models, Neutron cross sections, Nuclear energy levels, Nuclear spins, Gamma ray spectroscopy, Gamma rays, Beta ray spectroscopy, Gold.

A complete decay scheme of Re-184 and Re-184 (excited state), based on the collective model is proposed. Based on that scheme the Re-185 (n,2n) Re-184 cross section reported in the previous report was recalculated to be 1.91 ± 0.6 barns. Furthermore, the cross section for the Re-185 (n,2n) Re-184 (excited state) reaction was found to be 1.12 ± 0.4 barns. The Re (n,p) W cross section for 14.1 Mev neutrons was calculated to be 32.2 millibarns. This value is not exact but it seems to be about the right order of magnitude. Possible excited states of Au-196 were calculated by using the shell model. (Author)

21. NUCLEAR PROPULSION

AD-290 078 Div. 21, 12, 27
(TISTA/SEB) OTS price $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. GASEOUS CORE REACTORS,
by Robert V. Meghreblian and Henry J. Stumpf.
1962, 28p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Nuclear power plants, *Nuclear propulsion, Theory, Heat exchangers, Design, Mathematical analysis, Reactor fuels, Gases, Plasma physics, Thrust, Specific impulse, Space flight, Effectiveness, Design, Heating, Rocket motors, Symposia.

The feasibility of gaseous core reactors as applied to space flight is discussed. As a candidate to propel future generation rockets, the gaseous-fuel reactor promises to out-perform solid fuel propulsion by a factor of two or three.

22. ORDNANCE

AD-289 665 Div. 22
(TISTW/PCR) OTS price $1.10

Raymond Engineering Lab., Inc., Middletown, Conn.
ARM-SAFE DEVICE, XM-52.
Progress rept. for 10 Sep-10 Nov 62,
by Charles Nicoll. 10 Nov 62, 4p. (REL rept. no. 598-15)
(Contract DA 19-020-501-ORD-5273)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Production, Manufacturing methods, Tests, Guided missiles, Rockets.

AD-289 666 Div. 22
(TISTW/DLW) OTS price $1.10

Aberdeen Proving Ground, Md.
DESERT SUMMER ENVIRONMENTAL TEST OF FUZE SETTER, UNIVERSAL, XM31E1.
Letter rept. no. 1.
20 Nov 62, 3p. incl. illus. table.
Unclassified report

DESCRIPTORS: *Fuze setters, *Time delay fuzes, Lighting systems, Temperature, Humidity, Tests, Reliability, Desert tests, Projectile fuzes.

The universal fuze setter, XM31E1 is a T wrench type device for setting mechanical time and VT fuzes. It is considered universal in that the

interchangeable fuze sockets permit the use of the setter with various types of fuzes. The fuze setter contains two small light bulbs powered by two standard size 1-1/2 volt flash light batteries. The batteries are assembled inside one handle of the fuze setter. The two lights illuminate, through a red filter, the graduation numbers of the fuze. Therefore, fuze settings may be made at night and under other conditions of darkness. The fuze setter was exposed to desert summer environmental conditions from 1 July to 31 August 1962. During this period the ambient air temperature exceeded 105 F for 59 of the 62 days, a maximum ambient temperature of 115 F was recorded, and a maximum surface temperature of 156.1 F was recorded. (Author)

AD-289 812 Div. 22
(TISTW/RD) OTS price $2.60

Illinois U., Urbana.
GUN TUBE ON A FLEXIBLE CRADLE.
Final technical rept. on Artillery Carriage Dynamics Study,
by C. C. Fretwell. Sep 62, 19p. incl. illus. (T and AM rept. no. 229)
(Contract DA 11-022-508-ORD-3505, Proj. 5W01-01-034)
Unclassified report

DESCRIPTORS: *Gun barrel attachments, *Gun barrels, *Recoil mechanisms, Mathematical analysis.

An analysis is presented of the motion of a flexible cradle on which the recoiling parts move supported by flexible clips attached to the cradle. The motion of the gun tube is assumed to be prescribed. The cradle is represented by a uniform beam which is supported by a pin support and a rotational spring at one end and a linear spring at an interior point. The recoiling parts, assumed to be rigid mass, are supported on two linear springs which are fixed to the cradle. A pair of coupled integral equations are obtained which define the motion of the recoiling parts and a numerical technique is developed for their solution. (Author)

AD-290 066 Div. 22
(TISTW/RD) OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
HYPERVELOCITY IMPACT PHENOMENA.
Quarterly rept., 1 June-31 Aug 62,
by Karl R. Becker, Richard W. Watson, and Frank C. Gibson. 9 Nov 62, 20p. incl. illus. tables, 1 ref.
Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, Ammunition fragments, Spallation, Statistical distributions, Terminal ballistics, Penetration.

Within the limits of scale sizes tested, the qualitative features of the population distribution and of the distribution of spall mass are not altered when the projectile is scaled; the percentage of the total number or total mass of spall particles found in a given element of space behind the target is independent of the projectile scale size. In a given spall system, the spall particles having higher penetration capabilities do not appear to be distributed differently than the aggregate group. Scaling of the projectile appears to affect the spall systems from scaled targets in the following manner: (a) the number of target spall particles is proportional to the square of the projectile scale size; (b) the number of projectile particles is proportional to the cube of the scale size; and (c) the mass of both the target spall and projectile particles is proportional to the cube of the projectile scale size. (Author)

AD-290 261 Div. 22
(TISTE/CAM) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 9, 1 Sep-1 Oct 62,
by L. W. Ricketts. 1 Oct 62, 4p.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Solid state physics, Guided missile warheads, Switching circuits, Test methods, Trigger circuits, Temperature, Humidity, Acceleration, Vibration, Guided missiles (Tactical).

AD-290 301 Div. 22, 25
(TISTW/PCR) OTS price $1.10

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly progress rept. no. 4 for Oct 62,
by H.M. Kenworthy. 27 Nov 62, 7p. 6 refs. (Rept. no. 0689-01(04)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Metal films, *Electric bridges, Thin films, Beryllium compounds, Oxides, Infrared radiation, Toxicity, Heat transfer, Temperature.

The behavior of a metallic film when it is electrically heated and is in physical contact with a heat sink was investigated. The variable parameters in the manufacturing process for applying a bridge-heating element to a ceramic surface are considered. A generalized description of temperature measurement is presented. The toxicity of beryllia films is also discussed.

AD-290 315 Div. 22
(TISTM/ODN) OTS price $4.60

Westinghouse Air Brake Co., Wilmerding, Pa.
FABRICATE AND DELIVER STOCKS, FORE-ENDS, PRODUCTION TOOLING AND REPORTS FOR M-79 LAUNCHER.
Final rept. 12 Jan-12 Dec 62,
by K.W. Stevens and C.G. Hoge. 12 Dec 62, 41p. incl. illus.
(Contract DA 36-034-ORD-3609)
Unclassified report

DESCRIPTORS: *Grenades, *Launching, Glass textiles, Reinforcing materials, Expanded plastics, Foams, Urethanes, Polymers, Esters.

AD-290 502 Div. 22
(TISTW/DLW) OTS price $1.60

White Sands Missile Range, N. Mex.
AUTOMATIC ROCKET IMPACT PREDICTOR 2,
by Elmer J. Trawle and Henry Rachele. Nov 62, 8p. incl. illus. 2 refs. (Rept. no. SELWS-M-14)
Unclassified report

DESCRIPTORS: *Sounding rockets, *Rocket trajectories, *Impact computers, Meteorological instruments, Wind-direction indicators, Rocket flight, Mathematical prediction, Rockets, Automatic, Position finding, Terminal ballistics.

The Automatic Rocket Impact Predictor 2 (ARIP 2)

was designed to improve the capability of impact prediction for unguided, multiple-stage, high-altitude rockets. The system is still in the development stage. ARIP 2 will use analog wind data from each of eight wind instruments mounted on a 500-foot tower, and from an automatic tracking pilot-balloon system and will be sampled at the rate of two data points per second. Predetermined wind weighting factors and unit wind effects will be applied to these data to determine the displacement of the rocket impact due to the wind from the surface to 10,000 feet. The displacement will be added automatically and continuously to a wind displacement value (manual input) determined from rawinsonde-measured winds, thus providing a continuous plot (on a range map) of the predicted impact of as many as five rocket stages. (Author)

AD-290 599 Div. 22
(TISTW/PCR) OTS price $1.10

Army Artillery Board, Fort Sill, Okla.
TEST OF FLOTATION KIT FOR 155-mm HOWITZER, SELF-PROPELLED, T196E1.
Letter rept. (Partial).
15 Nov 62, 5p. illus. (Proj. FA 3459-2)
Unclassified report

DESCRIPTORS: *Floats, Howitzers, Tracked vehicles, Tests, Photographs, Self propelled guns.

The flotation kit for the 155-mm Howitzer, self-propelled, T196E1 and 105-mm Howitzer, self-propelled, T195E1 consists of: Turboblower, nine two-way selector valves, eight metal canisters with bags, one front bag with rubber cover, three barriers to be used as splash boards for sides and front of vehicle, and the necessary ducts and rubber tubing to inflate and deflate the bags. The US Army Artillery Board recommends that when the deficiencies and as many of the shortcomings as practicable have been eliminated, the flotation kit for the 155-mm Howitzer, Self-Propelled T196E1 and 105-mm Howitzer, Self-Propelled, T195E1, be type classified as Standard A. (Author)

AD-290 632 Div. 22
(TISTW/PCR) OTS price $3.60

Illinois U., Urbana.
LOADS, REACTIONS AND DEFLECTIONS FOR SIMPLIFIED ARTILLERY PIECES.
Technical rept. no. 232 on A Research Project Entitled Artillery Carriage Dynamics,
by M. Stippes. Sep 62, 32p. incl. illus.
(Contract DA 11-022-508-ORD-3505, Proj. 5W01-01-034)
Unclassified report

DESCRIPTORS: *Artillery, *Guns, Load distribution, Reaction kinetics, Deflection, Equations, Gun mounts, Projectiles, Friction, Geometry, Mathematical analysis, Motion.

A unified method is presented for analyzing the gross effects of friction, rod pull, and ground support on the motions and reactions in an artillery piece. A variety of models are presented in order that the changes in these effects may be studied as a function of configuration. All models are the simplest possible geometrically and as such do not permit investigation of second order effects. (Author)

AD-290 637 Div. 22
(TISTW/PCR) OTS price $3.60

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 36, 1 Aug-31 Sep 62.
1 Nov 62, 1v. incl. illus. (Rept. no. 62APB38)
(Contract DA 19-020-ORD-5455)
Unclassified report

DESCRIPTORS: *Aircraft guns, *Automatic weapons, Cams, Bolts, Boresighting, Stability, Tests, Design, Scattering, Solenoids, Airborne.

The following projects and studies are described: (1) Improved Parts Life: Bolt Roller Shaft Material Studies, Cycloidal Main Cam. (2) Boresighting and Target Study: Production Gun Data, Dispersion. (3) Gun-Aircraft Systems Compatibility: F104-G Clearing Problem. (4) Gun Components: Redesigned Unlocking Cam, Hook and Hook Roller Shaft Design, Lubricator, Clearing Cam Solenoid Modification. (5) Range Firing Records.

AD-290 670 Div. 22, 18
(TISTW/PCR) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE OPTIMUM ALLOCATION OF WEAPONS TO TARGETS: A DYNAMIC PROGRAMMING APPROACH,
by Ralph Shear and William Sacco. Sep 62, 25p. incl tables, 1 ref. (Rept. no. 1175)
(Projs. 503-05-005 and 503-06-002)
Unclassified report

DESCRIPTORS: *Weapons, *Targets, Mathematical analysis, Equations, Ammunition, Computer logic, Numerical analysis, Programming.

The optimality principle of dynamic programming is used to determine the optimum solution of a weapons allocation problem for the case involving a total weight constraint on the amount of ammunition employed. (Author)

AD-290 781 Div. 22
(TISTW/VB) OTS price $3.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
MALFUNCTION INVESTIGATION OF MINE, APERS, M18, LOT PA-35-3,
by Fred G. Ladd, Jr. and Gabriel D'Eustachio, Jr. Sep 62, 44p. incl. illus. tables (Technical rept. no. 3018)
Unclassified report

DESCRIPTORS: *Antipersonnel ammunition, *Mines, Failure (Mechanics), Radiographic analysis, Chemical analysis, Tests.

A test program was designed to disclose the cause of the high dud rate encountered at Guantanamo Bay. Radiographic examination, visual examination, and chemical analysis revealed no reason for failures. Test firings indicated that only faulty blasting caps or improper fuzing techniques can cause duds of the type occurring at Guantanamo Bay. (Author)

AD-290 818 Div. 22
(TISTW/PCR) OTS price $1.10

Illinois U., Urbana.
ARTILLERY CARRIAGE DYNAMICS STUDY.

Final technical rept.,
by M. Stippes. Sep 62, 4p. (T and AM rept. no. 233)
(Contract DA 11-022-508-ORD-3505, Proj. 5W01-01-034)
Unclassified report

DESCRIPTORS: *Gun mounts, Dynamics, Motion, Oscillation, Gun barrels, Equations, Ballistics, Projectiles, Load distribution, Deflection, Abstracting, Mathematical analysis.

A statement of the requirements of the original contract for a study of the dynamics of artillery carriages along with abstracts of the four technical reports and one informal report, and a list showing in which areas of the contract requirements the individual reports lie are presented. (Author)

AD-290 931 Div. 22
(TISTW/VB) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
HIT PROBABILITY OF T114 BAT VEHICLE SYSTEM,
by D. E. Walters. Aug 62, 13p. incl. illus. 2 refs. (Memo. rept. no. M63-8-1)
(DA Proj. 5S02-01-008)
Unclassified report

DESCRIPTORS: *Recoilless rifles, *Antitank guns, *Antitank ammunition, *Projectiles, Terminal ballistics, Errors, High explosive ammunition, Probability, Tracked vehicles, Self-propelled guns, Range.

An estimate is made of the multiple fire hitting performance of the repeating T114 BAT Vehicle System against a passive tank target. Its probability of hitting with at least one hit in 4 shots is computed from a set of error assumptions representing quasi-combat conditions on a 7.5 ft. by 7.5 ft. target at 800, 1000, and 1200 yards. (Author)

AD-290 933 Div. 22, 25
(TISTP/WH) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
A METHOD FOR EVALUATING THE RADIATION CHARACTERISTICS OF BRIGHT LIGHT SOURCES AS APPLIED TO THE XM-108 TRACER,
by J. F. Tyroler, M. Nowak and others. Dec 62, 32p. incl. illus. (Picatinny Arsenal technical rept. no. 3036)
Unclassified report

DESCRIPTORS: *Tracers (Ordnance), *Phosphors, *Spectrophotometers, *Test methods.

In the development of image-intensifier tubes to be incorporated in instrumentation used in the field, it is necessary to know the amount and nature of the radiant energy from various extraneous bright light sources to which the sensitive phosphors may be exposed during use. The object of the work described is to evaluate the radiation characteristics of one of these sources, the XM-108 tracer, in the 0.3- to 1.2-micron wavelength region, the spectral band of interest. Supplementary reports on other items will be published as testing is completed. (Author)

AD-291 043 Div. 22
(TISTW/PCR) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
SAFETY CONSIDERATIONS WITH ELECTROEXPLOSIVE DEVICES,
by R. E. Betts. 26 Nov 62, 15p. incl. illus. (Rept. no. RK-TR-62-10)
Unclassified report

DESCRIPTORS: *Electric primers, *Electric detonators, Hazards, Electrical effects, Electrostatics, Radiofrequency, Electric currents, Safety, Handling, Design, Test methods, Capacitors.

The general makeup of electroexplosive devices (EED) is described. The three basic electrical hazards of electrostatic, radio-frequency energy, and induced currents, and the methods by which these hazards cause accidental initiation are covered. General safeguards in designing and handling EED's for improved safety are included. (Author)

AD-291 060 Div. 22
(TISTW/PCR) OTS price $1.10

Aberdeen Proving Ground, Md.
SUMMER DESERT ENVIRONMENTAL TEST, 1962, OF 105-MM HOWITZER, SELF-PROPELLED, XM104.
Memo. rept. no. 5, 15 Oct-1 Nov 62,
by L. H. Renck. 1 Nov 62, 2p. incl. illus.
(Proj. no. CV-2-62Y)
Unclassified report

DESCRIPTORS: *Self propelled guns, *Howitzers, *Tracked vehicles, Cooling, Cooling fans, Tests, Terrain, Failure (Mechanics), Transmissions, Desert tests.

Cooling runs were completed with the modified cooling system. A new crankshaft pulley was installed to increase the fan to crankshaft speed from 1.2:1 to 1.4:1. A 1-5/8 inch pitch, 6 blade fan was utilized. Cooling runs were made at 1800, 2500, 3200 and 4000 rpm second gear, geared steer. The vehicle cooled adequately at 77 F ambient. When extrapolating to 115 F ambient, the vehicle cooled adequately at 1800, 2500 and 3200 rpm engine speeds. At 4000 rpm, the coolant temperature was 229 F when extrapolated to 115 F ambient. A seven blade, 1-5/8 inch pitch fan was installed with the originial crankshaft pulley and full-load cooling runs completed. The maximum coolant temperature obtained was 224 F at 4000 rpm when extrapolated to 115 F ambient. From all cooling data, it was shown that this combination of cooling system modifications gave the best cooling characteristics. Cooling tests were suspended at this point by the ATAC engineering representative. All cooling data will be included in a future report upon completion of data reduction. The mobility and endurance phase of the test were begun. (Author)

23. PERSONNEL AND TRAINING

AD-289 620 Div. 23
(TISTB/LMH) OTS price $1.10

Service Bureau Corp., San Jose, Calif.
PREDICTION OF AIRMAN SUCCESS FROM RESPONSES TO ITEMS OF THE KELLEY ACTIVITY PREFERENCE REPORT.
Final rept.,
by Benjamin Fruchter. June 62, 5p. incl. tables, 3 refs.
(Contract AF 41(657)412, Proj. 7719)
(PRL TDR 62-9) Unclassified report

DESCRIPTORS: *Aviation personnel, *Selection, Sociology, Aptitude tests, Vocational tests, Attitudes, Mathematical prediction, Test methods, Classification.

Items from a self-report inventory of personal background and activity preferences were selected by various methods and combined to predict successful completion of first-term enlistment. Two samples of airmen (2000 each) were used, each divided into a success group and a nonsuccess group for item analysis and validation purposes. Selection and weighting of valid items was determined on the initial sample; the scoring procedures were cross validated on the second sample. Although optimal item weighting produced higher validity with the initial sample, unit weighting of the most valid items proved as effective in cross validation. (Author)

AD-289 817 Div. 23, 30
(TISTB/CCH) OTS price $9.60

Mitre Corp., Bedford, Mass.
PROGRAMMED INSTRUCTION. A SELECTED BIBLIOGRAPHY,
by Charles S. Morrill, Dorothea T. Halpert, and Sylvia H. Pilsucki. June 62, 111p.
(Contract AF 33(600)39852)
(ESD TDR 62-225) Unclassified report

DESCRIPTORS: *Bibliography, *Teaching machines, *Training, Learning, Education.

This bibliography is intended to provide the reader with an extensive list of publications concerned with programmed instruction. Available programs for instruction are not listed here. However, the April 1962 issue of Programed Instruction, the bimonthly bulletin of The Center for Programed Instruction, states that the Center has prepared a pamphlet entitled Programs '62: A Guide to Programed Instructional Material Available to Educators by September, 1962. (Author)

AD-289 829 Div. 23
(TISTB/LMH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
A NEW DESIGN FOR TEACHING FOREIGN LANGUAGES USING DRAMATIC MOTION PICTURES AND PROGRAMMED LEARNING MATERIALS,
by Gerald Newmark. 9 Nov 62, 34p. 25 refs.
(Rept. no. SP-1027)
Unclassified report

DESCRIPTORS: *Motion pictures, *Education, *Language, Learning, Perception, Applied psychology, Effectiveness, Vocabulary, Reading, Training, Teaching machines.

A proposed project aimed at improving language instruction methods and augmenting the capabilities of schools for teaching foreign languages effectively, even where a shortage of skilled language teachers exists, is described. Problems encountered in national foreign-language area needs are listed: (1) the teacher shortage; (2) instruction sequence and neglect of listening comprehension; (3) student motivation in foreign language teaching; and (4) the development and implementation of technological innovations. A blueprint for the development of new methods and materials and for the conduct of research to obtain answers to important foreign-language learning questions is suggested. (Author)

AD-289 872 Div. 23
(TISTB/LH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
ATTITUDES AND CAREER INTENTIONS OF OFFICER TRAINING SCHOOL STUDENTS,
by Francis D. Harding and Robert A. Bottenberg. May 62, 8p. incl. illus. table, ref. (Rept. no. PRL TDR 62-8)
(Proj. 7719)
Unclassified report

DESCRIPTORS: *Officer personnel, *Aviation personnel, Reaction (Psychology), Vocational tests, Mathematical prediction, Education, Air Force, Training, Attitudes.

Questionnaire responses indicating attitudes of students toward an Air Force career were analyzed for 12 Officer Training School classes. Results indicate that about 35% of the students plan to make a career of the Air Force. The chief reasons for applying for OTS were identified as prestige and status of being an Air Force officer and the opportunities for travel and additional education. Using responses to selected items of the questionnaire which could become available at the time the candidate applies for OTS, it was possible to develop a retainability score which was highly indicative of the OTS graduate's intent to make the Air Force a career. (Author)

AD-289 873 Div. 23
(TISTB/LMH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
IMPORTANCE OF SITUATIONAL FACTORS IN THE MEASUREMENT OF OFFICER EFFECTIVENESS,
by Frank J. Vanasek and Robert A. Bottenberg. July 62, 10p. incl. tables, 4 refs. (Rept. no. PRL TDR 62-11)
(Proj. 7717) Unclassified report

DESCRIPTORS: *Officer personnel, *Psychometrics, Classification, Selection, Job analysis, Achievement tests, Factor analysis, Analysis of variance, Effectiveness.

The Officer Effectiveness Report is an important instrument in management of officer personnel. If factors not related to job performance affect the ratings, their influence should be taken into account. This study investigates the extent to which officer specialty, command assignment, and military grade affect distribution and reliability of effectiveness ratings. By applying multiple linear regression and analysis of variance techniques to ratings of 1500 Air Force officers, variance of ratings was apportioned between performance and nonperformance factors. When the effects of the three nonperformance factors is removed, the reliability of the ratings is lowered, but relevance to differences in job performance is increased. The influence of military grade on effectiveness ratings is greatest of the three situational factors, but all contribute significantly. It is assumed that the relationships come about through a number of influences, including systematic selection for mission, assignment, and promotion. (Author)

AD-289 877 Div. 23
(TISTB/LMH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
PREDICTION OF TECHNICAL SCHOOL SUCCESS FROM

HOMOGENEOUS BIOGRAPHICAL INVENTORY SCORES,
by Leland D. Brokaw. July 62, 9p. incl. tables, 5 refs. (Rept. no. PRL TDR 62-12)
(Proj. 7717)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Aptitude tests, Training, Selection, Learning, Leadership, Mathematical prediction, Correlation techniques, Classification.

A personal questionnaire, the Biographical Inventory, was part of the airman classification batteries up to 1959, with separate groups of items keyed for different job areas. This paper reports how the items of the most recent classification battery were assorted into 15 clusters on the basis of high correlations among items of each cluster. The scores for each group (homogeneous keys) were correlated with success in training for graduates of 8 Air Force training schools. The keys for Economic Level and Educational Success were the most generally valid. By multiple regression techniques, it was found that prediction of training school grades was almost as good from a regression equation based on graduates from all 8 schools as from separate equations for schools in each job area. Composite scores combining the inventory scores and the aptitude index were significantly more valid than the aptitude indexes alone (average .43 vs .46); but a simplified combination of the 3 or 4 most valid inventory keys with the aptitude index proved equally valid. Under conditions existing at the time these data were collected, a short biographical inventory consisting of 4 or 5 of the homogeneous scales would add significantly to the validity of aptitude indexes derived from the last Airman Classification Battery. (Author)

AD-289 890 Div. 23, 28
(TISTB/MS) OTS price $.75

Ohio State U., Columbus.
THE EFFECTS OF TASK ORGANIZATION, TRAINING TIME, AND RETENTION INTERVAL ON THE RETENTION OF SKILL.
Final rept., 1 May 60-31 Aug 62 on Training, Personnel, and Psychological Stress Aspects of Bioastronautics,
by James C. Naylor, George E. Briggs, and Walter G. Reed. Sep 62, 20p. incl. illus. tables, 12 refs.
(Contract AF 33(616)7269, Proj. 1710)
(AMRL TDR 62-107) Unclassified report

DESCRIPTORS: *Training, Learning, Tracking, Tests, Effectiveness.

Three variables (amount of training, task organization, and length of the retention interval), each at two levels, were studied to evaluate their influence upon the long-term retention of skill. Subjects were assigned to each of the eight experimental conditions, and were given practice on the criterion task for 2 or 3 weeks. The criterion task was composed of two subtasks, a procedural task involving the learning of discrete responses to discrete stimuli and a tracking task which involved continuous control of a three-dimensional compensatory display. All subjects returned for a retention test either 1 or 4 weeks subsequent to the end of training. Amount of training had a significant influence upon the degree of measured retention loss, as did task organization under conditions of lesser training. This was found for both tracking performance and for the number of omissive errors committed in performing the procedural task. Amount of absolute retention was generally related to (a) amount of training, (b) task organization, and (c) the length of the retention interval. (Author)

AD-290 356 Div. 23
(TISTB/MD) OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
EVALUATION OF NROTC AVIATION INDOCTRINATION FIELD TOURS FOR 1961-1962,
by Rosalie K. Ambler. 16 July 62, 13p. incl. tables, 2 refs. (Special rept. no. 62-5)
Unclassified report

DESCRIPTORS: *Naval Reserve, *Attitudes, Statistical analysis, Students, Naval aviation.

The purpose of this study was to assess the effectiveness of the 1961-1962 NROTC Aviation Indoctrination Field Tours by identifying changes in the students' knowledge about and attitudes toward naval aviation. Comparisons with previous NROTC and U.S. Naval Academy groups also were made. The results of this study were of twofold significance. (1) They represent a favorable endorsement of the AIFT concept, as was the case in previous studies, and (2) they reflect a general increase in the prestige of naval aviation as compared to previous years. (Author)

AD-290 545 Div. 23
(TISTB/CCH) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
PREDICTED SUCCESS OF LOW-APTITUDE AIRMEN,
by Mary Agnes Gordon and Eli S. Flyer. Aug 62, 10p. incl. tables (Rept. no. PRL TDR 62-14)
(Proj. 7719)
Unclassified report

DESCRIPTORS: *Aptitude tests, *Education, *Recruiting, Mathematical prediction, Aviation personnel.

This study examines the performance characteristics of a group of low-aptitude airmen who entered the Air Force during the first 6 months of 1956 and who either completed successfully a 4-year enlistment or were discharged for unsuitability or nonadvancement. It was found that a brief composite of aptitude tests and preservice educational level differentiated the successes from the failures quite well. When it is necessary to recruit from low-aptitude airmen, the additional screening would select those most likely to be of value to the Air Force. (Author)

AD-290 546 Div. 23, 28
(TISTB/CCH) OTS price $1.10

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
CONTRIBUTION OF EDUCATION TO THE RATED EFFECTIVENESS OF OFFICERS IN SCIENTIFIC AND ENGINEERING ASSIGNMENTS,
by Chester J. Judy. Sep 62, 7p. incl. tables, 7 refs. (Rept. no. PRL TDR 62-20)
(Proj. 6755)
Unclassified report

DESCRIPTORS: *Officer personnel, *Education, Scientific personnel, Engineering personnel, Mathematical prediction, Effectiveness.

Data on a sample of officers in scientific and engineering assignments were used to evaluate the role of selected educational variables as predictors of effectiveness ratings. Results, based on the solution of a series of multiple regression problems and the computation of mean effectiveness scores for subgroups of officers

with different characteristics, show that variance in the ratings can be partially explained in terms of educational information on the ratees. Educational data compare favorably with data from the military record as information which can be used to foretell effectiveness scores. Data on educational level, rather than data on the completion of a designated college curriculum, are the aspects of educational information which generally serve to identify officers who will receive the higher effectiveness ratings. (Author)

AD-290 551 Div. 23
(TISTB/CCH) OTS price $2.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
RANKORDER ESTIMATES OF THE TIME REQUIRED FOR CROSSTRAINING AMONG 98 AIRMAN SPECIALTIES,
by Marion E. Hook and Richard S. Massar. Aug 62, 19p. incl. tables, 5 refs. (PRL TDR 62-15)
Unclassified report

DESCRIPTORS: *Job analysis, *Military training, Mathematical computer data, Statistical analysis, Aviation personnel, Time.

When data based on experience are not available, it is often possible to obtain estimates of the relative time required to crosstrain personnel qualified in one specialty to equal proficiency in a second specialty. This paper reports the first study on devising efficient methods for collecting and analyzing such estimates. A procedure was developed for collecting data to form a matrix describing the relative cross-training-time demands for movements among a group of specialties. Rankorder estimates of the crosstraining-time requirements for the 9506 movements possible among the 98 5-level specialties were obtained from 477 Command and Staff College student officers. A computer program for hierarchical grouping was applied to these data to cluster specialties into groups such that crosstraining-time between specialties within groups is minimized. Mean crosstraining-time estimates were computed at each stage of the clustering procedure as a criterion for evaluating the cost of reducing the number of clusters. For illustrative purposes, the hierarchical structure at the 40-cluster stage is compared with the 40 career-field designations of the 98 specialties. (Author)

AD-290 732 Div. 23, 28
(TISTB/MD) OTS price $2.60

Naval Personnel Research Field Activity, San Diego, Calif.
REVIEW OF RESEARCH ON READING INSTRUCTION FOR ADULTS,
by Lloyd S. Standlee and Eugene A. Hooprich. Aug 62, 24p. incl. tables, 119 refs. (Technical bull. no. 62-12)
Unclassified report

DESCRIPTORS: *Reading, *Bibliography, Tachistoscopes, Effectiveness, Test methods, Personality, Education, Transfer of training, Vocabulary, Training.

The following conclusions are reached in this critical review of research on teaching instruction. There is a vast amount of literature concerning the teaching of advanced reading skills to adults. The literature tends to be subjective rather than research oriented, and the research designs that have been employed tend to be rather unsophisticated. No one method, material, or program organization has been shown to be best for teaching reading skills to adults. Nor has any one kind of subject been shown to have more aptitude for achieving reading skill gains. Some of the popularly stated benefits of reading instruction appear to be due to test artifacts or to a confounding of variables, for example, the confounding of reading comprehension with reading speed in timed tests. It may be said with some confidence, though, that adults attending reading improvement programs do achieve significant and relatively stable gains in reading speed. Consequently, courses in reading improvement are useful and could be particularly beneficial to naval personnel whose further education and work are largely dependent on reading a great amount of material. (Author)

AD-290 784 Div. 23, 28
(TISTB/MD) OTS price $1.10

Bureau of Naval Personnel, Washington, D. C.
DEVELOPMENT AND STANDARDIZATION OF FORMS 3 AND 4 OF THE NROTC CONTRACT STUDENT SELECTION TEST,
by Bernard Rimland and John H. Steinemann. Sep 62, 8p. incl. tables, 4 refs. (Technical bulletin no. 62-11)
Unclassified report

DESCRIPTORS: *Aptitude tests, *Naval reserve, Students, Selection, Officer personnel, Psychometrics, Standardization, Education.

Forms 3 and 4 of the Contract Student Selection Test (CSST) were designed to replace Forms 1 and 2 as the scholastic aptitude measure used in the selection of Contract students for the Naval Reserve Officer Training Corps. Data from the operational administration of Forms 3 and 4 in the fall semester of 1961 indicate that the two forms are psychometrically similar and may be used interchangeably. The new forms appear to be satisfactory in terms of their Kuder-Richardson reliabilities (.87 and .89) and in terms of their corelations (.80 and .79) with the Scholastic Aptitude Test (SAT). Tables are provided to permit conversion of CSST Form 3 or 4 total scores to Navy Standard Scores, percentile scores, or to equivalent SAT scores. The SAT conversion tables will reduce the need for testing with the CSST at those colleges where SAT scores are already on record. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-289 673 Div. 24
(TISTM/EJH) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
STABILIZATION PROCESSING WITH AFD-25, ACETIC ACID, AND THIOUREA,
by Christopher Lucas and Harvey Hodes. Apr 62, 12p. incl. illus. table, 2 refs. (ASRDL technical rept. no. 2296)
Unclassified report

DESCRIPTORS: *Photographic chemicals, *Processing, Photographic paper, Materials, Photography, Sodium compounds, Sulfites, Carbonates, Quinones, Phenols, Methyl radicals, Amines, Potassium compounds, Bromides, Acetic acid, Thiourea, Stability, Storage, Military requirements, Contamination.

Mobile photographic laboratories, used by the Dept. of the Army, employ stabilization proc-

essing as a means of eliminating the conventional washing procedure. The rapid processing system currently employed uses an Amidol developer, a sodium bisulfite stop bath, and a thiourea stabilization bath. Difficulties in developer procurement and satisfactory shelf life of the developer are serious defects in the system. AFD-25, acetic acid, and thiourea, used at a processing temperature of 100 F, were investigated as a replacement. Experimental data and results obtained during actual operating conditions are described and evaluated. Substitution of the AFD-25 system eliminates the previous difficulties and improves the stabilization process. (Author)

AD-289 855 Div. 24, 18
(TISTA/GEC) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
SPACE SURVEILLANCE SYSTEM EVALUATION BY A METHOD OF PHOTOGRAMMETRIC RESECTION,
by Dean C. Merchant. Oct 62, 16p. incl. illus. 10 refs. (Rept. no. RADC TDR 62-442)
(Proj. 5535)
Unclassified report

DESCRIPTORS: *Aerial reconnaissance, *Aerial photography, Projective geometry, Detection, Mathematical analysis, Effectiveness, Aerial targets, Mapping, Position finding, Geodetic data, High altitude.

The successful development of efficient data-handling procedures in connection with photogrammetric computations using reseau type photography has suggested the feasibility of handling the large number of resection solutions necessary in an accuracy evaluation program for a space surveillance system. The report develops the procedure for correcting the significant systematic errors in the measured co-ordinates, describes an adjustment for application to stabilized aerial photography, and, finally, develops the method for calculating errors in the adjusted results. Theoretical investigations indicate that an accuracy of one foot (standard error) in location of the target aircraft along each axis for each ten thousand feet of altitude above the control is likely. (Author)

AD-290 071 Div. 24, 18
(TISTA/GEC) OTS price $9.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A SCIENTIFIC INVESTIGATION INTO PHOTOGRAPHIC RECONNAISSANCE FROM SPACE VEHICLES.
Quarterly rept. no. 3, 1 Jan-31 Mar 59,
by Niels Y. Andersen, Leo S. Packer, and J. W. Ford. 15 Apr 59, 118p. incl. illus. tables, refs. (Rept. no. VF-1260-P-3)
(Contract AF 33(616)5870, Proj. 8(76-6291)
Unclassified report

DESCRIPTORS: *Aerial reconnaissance, *Aerial photographs, *Aerial cameras, Optical images, Design, Military requirements, Atmosphere, Refraction, Diffraction, Optics, Satellite attitude, Control systems, Radiation effects, Orbital flight paths, Space environmental conditions, Stars, Satellite vehicles, Photo interpretability, Optical systems.

The limitations and requirements of stellar photography were studied as applied to the problem of the determination of camera orientation at the time of the photograph. Analyses of optical and camera design criteria and of the photographic system response as it effects image detection were initiated. A study of satellite control dynamics was essentially completed. Environmental studies include the most recent radiation data, experimental data on the effects of radiation on film graininess and fogging, and a study of radiance contrast from satellite altitude looking through a Rayleigh atmosphere. (Author)

AD-290 340 Div. 24
(TISTA/GEC) OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT PHOTOREK III. TARGETS FOR ANALYSIS OF ATMOSPHERIC TURBULENCE EFFECTS ON AERIAL PHOTOGRAPHY,
by R. R. Berggren, P. B. McKowen and others.
8 Oct 62, 40p. incl. illus. tables, 8 refs.
(Rept. no. VF-1682-G-1; Technical note no. 1)
(Contract AF 33(657)8993, Proj. 6620)
Unclassified report

DESCRIPTORS: *Aerial photography, *Targets, Atmosphere, Refraction, Optical images, Deflections, Measurements, Turbulence, Design.

Requirements for targets to be used in experiments on the effects of natural atmospheric turbulence on aerial photography are analyzed, and recommendations are made. In considering target design criteria, a description or model of the atmospheric inhomogeneities responsible for image degrading effects is postulated. Target types are then analyzed with respect to their suitability for defining the nature of the responsible atmospheric regions, considering the conditions of test and the data analysis procedures available. Target size requirements are derived based on anticipated levels of refraction effects, variations in photographic exposure, the range of image scales expected, and the known imaging characteristics of the recording camera. Since the number and size of targets to be employed is restricted, target priorities are discussed, and a representative layout of targets is provided. (Author)

AD-290 557 Div. 24
(TISTP/FR) OTS price $1.60

Scripta Technica, Inc., Washington, D. C.
USE OF POLARIZATION LIGHT FILTERS IN AERIAL PHOTOGRAPHIC SEA SURVEYS,
by A. M. Kuzina, N. S. Ramm, and I. V. Semenchenko. 1962, 13p. incl. illus. table, 18 refs. (Trans. no. T-1501, Trans. from News of Institutes of Higher Learning of the USSR Ministry of Specialized Higher and Intermediate Education, Geodesy and Aerial Photographic Surveys Section, No. 6:83-95, 1960)
Unclassified report

DESCRIPTORS: *Polarizing filters, *Aerial photography, Oceans, Light, Sun, Reflection.

Aerial photographic surveys of the surface of the sea are being performed to investigate sea waves and to map currents. For these reasons, the struggle against errors occuring in aerial photographic surveys of seas and oceans assumes considerable importance. Among such serious errors is the image of the 'sun spots', that is, the mirror reflection, on the aerial photographic film, of the sun light striking the surface of the water, and the sharp increase in light dissipation within the objective of the aerial camera, resulting from the intense brightness of the sun spot; this results in an excess of light on the portion of the aerial photograph that is opposite the spot image. The theory and methodology for reduction of these errors with the aid of polarized light filters (polaroids) are presented. (Author)

AD-290 720 Div. 24
(TISTP/FR) OTS price $5.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT PHOTOREK II. A STUDY OF AERIAL PHOTOGRAPHIC CONTRAST ATTENUATION BY THE ATMOSPHERE.
Final rept.,
by Melvin J. Mazurowski and John E. Walker.
25 May 62, 43p. incl. illus. tables, refs.
(Rept. no. VF-1478-P-2)
(Contract AF 33(616)7481)

Unclassified report

DESCRIPTORS: *Aerial photography, *Light, Scattering, Atmosphere, Humidity, Particles, Photographic film, Density.

The PHOTOREK II Project, a study of photographic contrast reduction as a function of altitude, wavelength, and meteorological conditions, is discussed. The source of photographic contrast reduction by the atmosphere and a survey of previous efforts in this area are presented. The experimental plan and the targets, photometers, cameras, and meteorological equipment used to obtain contrast reduction and weather data are described. The processing and analysis of the data are presented in detail. The use of scattering theory in conjunction with meteorological factors is illustrated and the results obtained to date are presented. Conclusions and recommendations for future improvements and refinements of the experiment are included. (Author)

25. PHYSICS

AD-289 614 Div. 25
(TISTP/WH) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
ELECTROMAGNETIC SCATTERING FROM ASPHERICAL NONUNIFORM MEDIUM. PART I. GENERAL THEORY,
by Donald Arnush. Oct 62, 20p. 6 refs. (Rept. no. 6110-7466-RU-001)
(Contract AF 04(694)1)
(BSD TDR 62-301, pt. 1)

Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Scattering, *Dielectrics, *Radar echo areas.

The scattering of electromagnetic waves by a spherically symmetric continuous dielectric is examined. Two distinct methods for calculating the scattering amplitude are derived. It is shown that the scalar approximation is, in general, extremely poor. The radar cross section, is discussed in some detail. (Author)

AD-289 615 Div. 25
(TISTP/WH) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
ELECTROMAGNETIC SCATTERING FROM A SPHERICAL NONUNIFORM MEDIUM. PART II. THE RADAR CROSS SECTION OF A FLARE,
by Robert S. Margulies and Frederick L. Scarf.
Oct 62, 19p. incl. illus. table, 9 refs. (Rept. no. 6110-7466-RU-002)
(Contract AF 04(694)1)
(BSD TDR 62-301, pt. 2) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Scattering, *Dielectrics, *Radar echo areas, *Quantum mechanics, *Flames, Ionization.

The radar cross section for scattering of electromagnetic waves by a plasma having an electron concentration proportional to 1/r squared is calculated. The exact solution is compared with the scalar approximation. It is found that the exact solution can be orders of magnitude smaller than any of the usual approximations. (Author)

AD-289 669 Div. 25
(TISTM/AJM) OTS price $2.60

Alloyd Corp., Cambridge, Mass.
A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE.
Quarterly progress rept. no. 6, 1 Aug-1 Nov 62,
by M. J. Hordon and P. Weihrauch. 1 Nov 62,
23p. incl. illus. tables, 8 refs.
(Contract NOw 61-0656-c)

Unclassified report

DESCRIPTORS: *Single crystals, *Lithium compounds, *Fluorides, Fatigue (Mechanics), Roller bearings, Loading, Surfaces, Crystal structure, Stresses, Theory, Test equipment, Plastic flow, Liquids, Lubricants, Steel, Shear stresses, Torque, Deformation.

Selected LiF crystals with initial dislocation densities of approximately 10 to the 5th power/sq cm were subjected to applied rolling loads ranging from 25 to 500 gms. Measurements of the surface width of the deformed zone trace and the dislocation density within the deformed zone were made after loading. Tabulated results indicate the surface deformation characteristics imposed by rolling loads. In order to study the effects of various fluids on the torsional fatigue life of 52100 tool steel, a machine and a specimen were designed. The machine consists of a lever arm which is attached to one end of the specimen perpendicular to the specimen axis. (Author)

AD-289 801 Div. 25, 7
(TISTP/WH) OTS price $2.60

General Electric Co., Schenectady, N. Y.
EXPLORATORY ENERGY CONVERSION STUDY OF PHOTON THERMIONICS.
Quarterly technical progress rept. no. 1,
by W. J. Kearns. Nov 62, 20p. incl. illus.
9 refs. (Rept. no. R-635 Q-1)
(Contract AF 33(657)9202, Proj. 8173)

Unclassified report

DESCRIPTORS: *Photons, *Thermionic emission, *Gas ionization, *Cesium, *Photonuclear reactions, *Gas discharges, Vapors.

Investigation concerns the use of photon processes for thermionic converters. The program objective is to determine the feasibility of enhancing the performance of cesium vapor thermionic converters at low temperatures, i.e., 1200 C, through photon processes. These photon processes are expected to increase the power output of a cesium converter by reducing the drop through the converter under load conditions by (1) increasing the conductivity of the positive column, (2) altering the potential distribution in the inter-electrode space, or (3) a combination of such effects. There is, in addition to the effect on full load operation, the use of photons to aid in establishing the discharge by generating enough ion pairs to accomplish gas tube breakdown or arc initiation, in the usual sense. (Author)

AD-289 805 Div. 25, 7
(TISTM/TCG) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept., 1 July-30 Sep 62,
by W. Godsin. 10 Oct 62, rev. 10 Nov 62, 18p. incl. illus. 2 refs. (Rept. no. GA-3562; Supersedes Rept. no. GA-3562, dtd. 10 Oct 62, AD-286 700)
(Contract AF 33(657)8563, Proj. 8173)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Electric power production, *High temperature research, Vacuum systems, Uranium compounds, Zirconium compounds, Carbides, Surface properties, Microstructure, Diffusion, Titanium, Cesium.

Post-test analysis of Cell E indicates the necessity of improving the cleanliness of future cell assemblies and especially the need for techniques to determine the emitter condition throughout final assembly. A 10 UC - 90 ZrC emitter is installed in Cell F. Thermocouple installation and calibration and high-temperature vacuum emission tests are being conducted prior to the final closure of the cell. Recent vacuum emission studies carried out under other contracts on three UC compositions--10 UC - 90 ZrC, 30 UC - 70 ZrC, and 90 UC - 10 ZrC--demonstrate that emission behavior is essentially independent of bulk U content. The presence of some U on the emitting surface is of the utmost importance. Intentional ''poisoning'' of the surface of sample emitters has been produced by exposure to air at room temperature. These findings have been substantiated on the Mark V-E and V-F emitters. It has been concluded that the emitter surface must be activated in addition to providing a clean cell environment during operation. (Author)

AD-289 807 Div. 25, 20
(TISTM/ODN) OTS price $11.50

Hebrew U. (Israel).
FIRST INTERNATIONAL CONFERENCE ON PARAMAGNETIC RESONANCE THE HEBREW UNIVERSITY OF JERUSALEM, ISRAEL, JULY 16 - 20, 1962.
Final rept.
1962, 156p.
(Grant Nonr(g)-00070-62)
Unclassified report

DESCRIPTORS: *Symposia, *Paramagnetic resonance, Electrons, Spin, Resonance, Transition elements, Ions, Rare earth elements, Theory, Test methods, Organic compounds, Crystals, Polarization, Color centers, Glass, Phosphors.

Abstracts from the International Conference on Paramagnetic Resonance at the Hebrew University of Jerusalem, Israel, July 16-20, 1962 are presented. The following broad areas are covered: electron spin resonance of iron group elements and rare earth ions; theory related to electron spin resonance; electric field and pressure effects on electron spin resonance spectra; experimental techniques for magnetic resonance; paramagnetic relaxation, line width and pair spectra; line shape and dynamic polarization; electron spin resonance of F centers, phosphors, and glasses; electron spin resonance of biological materials; and organic crystals and radiation damage.

AD-289 824 Div. 25
(TISTP/WH) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
CORRELATION DIAGRAM FOR H2: OSCILLATOR STRENGTHS,
by James M. Peek and Edwin N. Lassettre. Sep 62, 7p. incl. illus. table, 7 refs. (Scientific rept. no. 3)
(Contract AF 19(604)4541, Proj. 7635)
(AFCRL 62-1042) Unclassified report

DESCRIPTORS: *Hydrogen, *Oscillators, *Molecular structure, *Electron transitions, Molecules.

AD-289 834 Div. 25
(TISTP/TL) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
THE LOGARITHMIC TEMPERATURE DEPENDENCE OF THE PARTITION ENTROPY,
by D. S. Villars. Sep 62, 18p. incl. illus. tables, 13 refs. (Rept. no. NOTS TP 3021)
(NAVWEPS rept. no. 7970)
Unclassified report

DESCRIPTORS: *Gases, *Entropy, *Thermodynamics, *Quantum statistics, Vibrations, Chemical reactions, Energy, Probability, Atoms, Molecules.

The partition part of the entropy (i.e., R ln Q) has a much simpler theoretical temperature behavior than entropy itself or enthalpy, yet completely defines the effect of temperature on the free energy. A study has been made of the dependence on logarithm of temperature, which in simplest cases reproduces the whole temperature effect, of the theoretical function for perfect gases. Quite good values are extrapolatable for atoms and diatomic molecules. Discrepancies become greater as one proceeds to molecules having low-frequency vibrations. As would be anticipated extrapolations in which two data points give an empirical number of effective virtual degrees of freedom are better than those obtainable by extrapolations from only one datum point. (Author)

AD-289 868 Div. 25
(TISTP/WH) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
APPLICATION OF VARIATIONAL EQUATION OF MOTION TO THE NONLINEAR VIBRATION ANALYSIS OF HOMOGENEOUS AND LAYERED PLATES AND SHELLS,
by Yi-Yuan Yu. Feb 62, 28p. 16 refs. (Technical note no. 14)
(Contract AF 49(638)453)
(AFOSR-2256) Unclassified report

DESCRIPTORS: *Laminates, *Sandwich panels, *Metal plates, *Structural shells, *Nonlinear differential equations, *Integration, *Elasticity.

An integrated procedure is presented for applying the variational equation of motion to the approximate analysis of nonlinear vibrations of homogeneous and layered plates and shells involving large deflections. The procedure consists of a sequence of variational approximations. The first of these involves an approximation in the thickness direction and yields a system of equations of motion and boundary conditions for the plate or shell. Subsequent variational approximations with respect to the remaining space coordinates and time, wherever needed, lead to a solution to the nonlinear vibration problem. The procedure is illustrated by a study of the

nonlinear free vibrations of homogeneous and sandwich cylindrical shells, and it appears to be applicable to still many other homogeneous and composite elastic systems. (Author)

AD-289 871 Div. 25
(TISTM/ODN) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
NONLINEAR FLEXURAL VIBRATIONS OF SANDWICH PLATES,
by Yi-Yuan Yu. Feb 62, 20p. 10 refs. (Technical note no. 12)
(Contract AF 49(638)453)
(AFOSR-1310) Unclassified report

DESCRIPTORS: *Sandwich construction, *Nonlinear differential equations, Vibration, Frequency, Deformation, Theory, Mathematical analysis, Stresses.

A set of nonlinear equations describing the vibrations of sandwich plates is derived. These equations are then applied to a plate vibrating in plane strain and to a rectangular plate; with the boundary edges assumed to be hinged in both cases. It is shown that the nonlinear frequencies increase with the amplitude of vibration. It is shown also that transverse shear deformations play an important role; however, the effect produced by these deformations decreases with increasing amplitudes of vibration. (Author)

AD-290 053 Div. 25
(TISTP/TL) OTS price $1.10

Free U. of Brussels (Belgium).
CORRELATIONS IN A NON-ISOTHERMAL PLASMA,
by I. Prigogine and Ph. de Gottal. 1962, 7p. 5 refs.
(Grant no. AF EOAR 62-16)
Unclassified report

DESCRIPTORS: *Plasma physics, *Quantum statistics, Electrons, Ions, Particles, Statistical functions, Statistical distributions, Groups (Mathematics), Electromagnetic fields, Velocity, Temperature, Relaxation time, Spins, Dipole moments, Tensor analysis, Integral transforms, Oscillators, Potential theory.

The simple example treated in this analysis clearly shows the power of the method based on the creation fragments for calculating correlation functions. The procedure exposed here will apply each time there are two groups of states in a system, such that each group reaches statistical equilibrium in a much shorter time than the relaxation time of the system as a whole. (Author)

AD-290 086 Div. 25
(TISTP/TL) OTS price $3.60

Elcon Lab., Inc., Watertown, Mass.
STUDY OF TECHNIQUES FOR A HIGH POWER, FAST WAVE PLASMA CYCLOTRON AMPLIFIER.
Quarterly interim engineering rept. no. 2,
by Edwin Langberg, James L. Burkhardt and others. 20 Nov 62, 31p. incl. illus. (Rept. no. R-11-62-3)
(Contract AF 33(657)8852)
Unclassified report

DESCRIPTORS: *Plasma physics, *Cyclotrons, *Traveling wave tubes, *Microwave amplifiers, Magnetic fields, Argon, Gases, Rhenium, Thermionic emission, Measurement, Cathodes.

The design of a fast wave cyclotron gain experiment is described. The tube uses a direct current pumping field parallel to the magnetic field. The gas fill consists of a mixture of argon and a small impurity of a molecular gas. A rhenium cathode, resistant to chemical attack, is used as a thermionic emitter. The tube comprises a microwave cavity operating in the TE(012) mode at the cyclotron frequency. Coupling to the r.f. field which is orthogonal to the pumping field provides for indication and measurement of the plasma gain properties. (Author)

AD-290 090 Div. 25
(TISTP/JW) OTS price $2.60

Stanford U., Calif.
EVALUATION OF THE VAN HOVE CORRELATION FUNCTIONS FOR CERTAIN PHYSICAL SYSTEMS,
by Roger B. DeBar. 1962, 23p. 13 refs. (Rept. no. ITP-74)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Functions, Plasma, Crystals, Equations, Energy, Fluid flow, Heat transfer, Scattering, Helium, Density.

The space and time Fourier transforms of the Van Hove correlation function are evaluated for the cases of coherent scattering from simple crystals and, in a 'quantum hydrodynamics' approximation, from liquid helium. A compact approximate expression for the one-phonon part of the crystal correlation function transform is given, and the contribution of the two-phonon term is considered. A new method of obtaining quantum-mechanical corrections to the classical expression for the Van Hove self-correlation function is discussed, and the result is shown to be of greater potential accuracy than those previously given in the literature. As a test, the prescription is applied to the Langevin equation result for the classical correlation function, and the product is found to differ significantly from recent results, but to be in agreement with an older expression obtained by Vineyard. (Author)

AD-290 202 Div. 25, 12
(TISTP/JW) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
CONSTITUTIVE RELATIONS FOR HYPERVELOCITY IMPACT.
Quarterly progress rept. no. 6, May-Aug 62,
by T. D. Riney. Nov 62, 19p. incl. illus. tables, 19 refs.
(Contract AF 08(635)1713, Proj. 9860)
(APGC TDR 62-59) Unclassified report

DESCRIPTORS: *Impact shock, *Hypervelocity vehicles, *Particles, Equations of state, Fluid flow, Stresses, Resistance, Thermodynamics.

Tentative relations are presented for the equation of state, the thermodynamic and strain rate dependent flow-resistance coefficient, and the fracture criteria for a dynamic tri-axial stress condition. These constitutive relations are required for the theoretical calculations being made for the axisymmetric hypervelocity impact problem. Improved hypotheses are expected to evolve as more experimental data become available and as computational experiments are performed. To facilitate the evaluation and comparison of various hypothesis, the relations are written into the computer program as subroutines. (Author)

AD-290 204 Div. 25
(TISTP/JW) OTS price $7.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
VIBRATION DAMPING STUDIES.
Final rept., 16 June 60-31 Mar 61,
by Edward M. Kerwin, Jr. and Richard J. McQuillin. 29 Sep 61, 80p. incl. illus. tables, 13 refs. (Rept. no. 852)
(Contract NObs-78799)
Unclassified report

DESCRIPTORS: *Damping, *Vibration, Wave transmission, Boundary layer, Viscosity, Elasticity, Velocity, Energy, Shear stresses.

The progressive-wave experiments done so far indicate that the method appears to be a valid one for evaluating vibration damping treatments, the advantages of the method will make it more attractive in certain cases (higher damping, shorter wavelengths, etc.), and further work would be required before such a test could be specified for routine testing. (Author)

AD-290 222 Div. 25, 14
(TISTM/BRW) OTS price $3.00

Naval Research Lab., Washington, D. C.
THERMOELECTRICITY.
Quarterly status rept. no. 9,
by J. W. Davisson, Joseph Pasternak and B. B. Rosenbaum. Oct 62, 150p. incl. illus. tables.
(NRL memo. rept. no. 1361)
(In cooperation with Bureau of Ships, Washington, D. C.
Unclassified report

DESCRIPTORS: *Thermoelectricity, Power supplies, Thermal conductivity, Liquids, Solids, Sulfides, Selenides, Tellurides, Semiconductors, Oxides, Materials.

Westinghouse Electric Corporation has partially reduced troublesome cracking in thermocouples of pure GeTe by the addition of approximately 10% TlBiTe2. General Atomic division of General Dynamics Corporation found that barium doping improved the thermoelectric performance of cerium sulfide. Chrysler Corporation, in their investigation of compounds of high atomic weight refractory metals (Hf, Ta, W, Re) with IV B(Ge), V B(As, Sb, Bi),and VI B(Se, Te) elements, found that these are not promising as thermoelectric materials. Similarly, investigation of thorium and uranium sulfides, selenides, and tellurides by Electro-Optical Systems, Inc., did not appear promising. Thermal instability has thus far limited MoTe2 and WTe2 alloys to 400 to 500 C at the most. An investigation by the U.S. Naval Engineering Experiment Station of twenty commercial n-type lead tellurides indicated that no improvement in material efficiency should be expected by changing cylindrical-shaped elements to truncated conical shapes. (Author)

AD-290 231 Div. 25
(TISTE/CAM) OTS price $10.50

David Sarnoff Research Center, Princeton, N. J.
INVESTIGATION OF CARRIER INJECTION ELECTROLUMINESCENCE.
Semiannual scientific rept. no. 2, 15 Jan-15 July 62,
by A. G. Fischer, W. Fonger, and A. S. Mason. 15 Aug 62, 130p. incl. illus. tables, 4 refs.
(Contract AF 19(604)8018, Proj. 4608)
(AFCRL 62-588) Unclassified report

DESCRIPTORS: *Luminescence, *Luminescent materials, *Phosphors, *Zinc compounds, *Single crystals, Thin films, Boron, Gallium compounds, Phosphorus, Particles, Refractive index, Phosphides, Brightness, Voltage, Field emission, Measurement, Photoemission, Effectiveness, Evaporation, Electric connectors, Optics, Microscopy, Scattering.

A summary is presented of the work on ac electroluminescence of ZnS powder. Novel basic observations and new measurements on el lines in powder particles are described. A new comprehensive model is derived and compared with previous models. The model is applied to all known facts of powder el and yields many new insights. It is shown that ac-el is caused by bipolar tunnel injection. A description is given of the realization of dc carrier injection electroluminescence. Conducting, photoluminescent ZnSe crystals grown from the melt under Zn pressure show high electron mobilities and display dc-el. Pure ZnSe and ZnTe starting materials have been prepared by new methods, and advances in zone purification were made. Difficulties were encountered in Czochralski pulling of these materials, but approaches were found. Flux-grown GaP crystals show near-band-gap radiation, sublimed crusts bright red injection el. No miscibility between GaP and BP could be observed, and BP was difficult to prepare in pure form. ZnSe was recrystallized from supersaturated zinc flux. (Author)

AD-290 235 Div. 25
(TISTP/JW) OTS price $9.10

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
GAS FILM BOUNDARY LAYER STABILIZATION FEASIBILITY DEMONSTRATION.
Final rept., 16 May 61-15 Nov 62.
15 Nov 62, 1v. incl. illus. 9 refs. (Rept. no. ER-5110)
(Contract NOw 61-0845-c)
Unclassified report

DESCRIPTORS: *Boundary layer, *Laminar boundary layer, Gases, Thin films, Surfaces, Stability, Feasibility studies, Drag, Pressure.

The feasibility of stabilizing the laminar boundary layer on a submerged body by establishing and maintaining a thin gas film on the surface of the body was investigated. The purpose was to demonstrate the existence of a stable gas film, to uncover problem areas unpredicted by analysis, and to secure preliminary design data for the ultimate development of a low drag prototype vehicle. Although a stable film was obtained, the problems encountered in establishment and the apparent extreme sensitivity of the film make the feasibility of gas films as a practical means of reducing drag doubtful. It is recommended, however, that future work in this area is warranted to further investigate the effects of pressure gradient, surface tension, initial conditions in the gas and water and disturbances on stability, the clarification of which may lead to a workable design eliminating the problems encountered in this study. (Author)

AD-290 251 Div. 25
(TISTP/GRW) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
INFRARED EMISSION STUDIES OF VIBRATIONAL RELAXATION IN SIMPLE MOLECULES,
by Peter Borrell. 22 Nov 62, 26p. incl. table, 11 refs. (Technical rept. no. 3)
(Contract Nonr-185826, Proj. NR 357-275)
Unclassified report

DESCRIPTORS: *Molecules, *Relaxation time, *Infrared radiation, Shock tubes, Gases, Density, Energy, Shock waves, Detectors, Germanium.

A preliminary study of infrared emission from shock heated gases was carried out, using a gold doped germanium detector. These measurements gave lower limits to the transition probabilities for the uptake of vibrational energy on collision, but the correct values are certainly no more than double those quoted. The values in the vicinity of 1000 K are: HCl, 3x1/100,000; HBr, 2.3x1/100,000; CO2(U3)2.1x1/100,000; and N20(U3), 1.8x1/100,000. (Author)

AD-290 300 Div. 25, 30, 14
(TISTP/JW) OTS price $10.10

Armour Research Foundation, Chicago, Ill.
PHOTOELASTIC STRESS ANALYSIS OF A PRESSURE VESSEL.
Final rept., 1 July 60-31 Aug 62,
by R. L. Marino, Jr. and W. F. Riley. 15 Nov 62, 117p. incl. illus.
(Contract DA 11-022-503-ORD-3469)
Unclassified report

DESCRIPTORS: *Photoelastic materials, *Pressure vessels, *Pipe fitting, Couplings, Stresses, Load distribution, Epoxy resins, Plastics, Polariscopes, Pressure.

The complete results of a three phase program conducted to determine stress distributions in a pressure vessel are reported and several redesign versions of the same vessel are presented. The stress determinations were made by using conventional three-dimensional photoelasticity techniques. The loading applied to the models for most of the studies was internal pressure. The results of the analysis of the original vessel indicated that several regions of high tensile stress existed. The stresses in two of these regions (thread relief grooves and keyway) could easily be reduced by incorporating larger radii in the fillets. The highest stresses in the vessel, however, existed in the small fillets at the roots of the sectored threads where major redesign in the form of thread contour changes would be required to effect significant stress reductions. The major portion of the research in the last two phases of the program was directed toward reducing the stresses in the fillets of these threads. The thread form and root profile which was selected for analysis in the final three-dimensional model was developed in an auxiliary series of two-dimensional studies. Final evaluation in the three-dimensional model indicated that stresses in the sectored threads of the prototype could be reduced by approximately 22% if the recommended design is incorporated. (Author)

AD-290 306 Div. 25, 8, 20
(TISTP/WH) OTS price $6.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 11, 16 June-15 Sep 62,
by R. Novick. 15 Sep 62, 57p. incl. illus. tables, refs.
(Contract DA 36-039-sc-78330)
Unclassified report

DESCRIPTORS: *Photonuclear reactions, *Electron transitions, *Nuclear magnetic moments, *Nuclear spins, *Radioactive isotopes, *Zinc, *Cadmium, *Cesium, *Solid state physics, *Electromagnetic waves, Extremely high frequency.

Double photon excitation of the 6S1/2-9D3/2 transition in atomic cesium has been observed when the vapor is illuminated with the intense light of a pulsed ruby laser. These observations provide a simple and direct test of the theory of two photon processes. New values are reported for the spin, magnetic moment, and quadrupole moment of 245 day Zn-65 and 43 day Cd-115m. These results were obtained by optical double resonance. New precise values of the level crossing fields in 6.7 hour Cd-107 and 245 day Zn-65 are reported. A program of solid state research involving a study of the demagnetized state has been initiated. The demagnetized state will be achieved by adiabatic demagnetization in the rotating frame; it is expected that this technique will be useful in the study of rare spins. Polarization studies at S band have been made on a number of radio sources with the NRL radio telescope and a 9.4 cm maser preamplifier that was designed and constructed at CRL. Large polarization was found in Hercules A, 3C 433, and 3C 295. (Author)

AD-290 368 Div. 25, 9
(TISTP/JW) OTS price $2.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PLATE DAMPING DUE TO THICKNESS-COMPRESSION WAVES IN ATTACHED VISCOELASTIC LAYERS,
by Edward M. Kerwin, Jr. and Eric E. Ungar.
12 June 62, 19p. illus. 7 refs. (Rept. no. 938)
(Contract NObs-78799, Proj. SF 013 1104)
Unclassified report

DESCRIPTORS: *Damping, *Elasticity, Viscosity, Energy, Wave characteristics, Motion, Resonance, Boundary layer.

The purpose of the present report is to propose and attempt to validate an additional mechanism for energy dissipation in the viscoelastic layer in order to account for damping increases. The mechanism proposed is associated with waves propagating in the thickness direction, and the damping peaks are ascribed to corresponding standing wave resonances. The governing equations are derived in the first of the following sections; thereafter theoretical predictions are compared with experimental results. Conclusions are summarized and extensions of the present work are discussed. (Author)

AD-290 469 Div. 25
(TISTP/WH) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
STATISTICAL MECHANICS OF RELATIVISTIC STREAMS. PART I,
by K. M. Watson and S. A. Bludman. Nov 59, 23p. incl. illus. 8 refs.
(Contract Nonr-272800; In cooperation with Lawrence Radiation Lab., Berkeley, Calif.)
Unclassified report

DESCRIPTORS: *Relativity theory, *Particle beams, *Statistical analysis, *Transport properties, *Space weapons; Mechanics.

The small amplitude motion of a relativistic beam passing through plasma is studied using the transport theory. For the equilibrium state, a relativistic Maxwellian velocity dis-

tribution is obtained. The linearized Boltmann equation is used to relate beam and plasma density and current perturbations to perturbations in the electromagnetic field. Approximate criteria are obtained to justify the neglect of static fields. The boundary conditions that must be satisfied at a sharp boundary are derived. Finally, these general results are specialized to those of a uniform beam. (Author)

AD-290 487 Div. 25
(TISTP/WH) OTS price $11.00

Geiger and Hamme Labs., Ann Arbor, Mich.
THE CONCEPT OF DAMPING OF STRUCTUREBORNE SOUND AND VIBRATION FOR NOISE CONTROL.
Apr 61, 129p. incl. illus. tables, 23 refs.
(Rept. no. USN-1)
(Contract NObs-73549, Proj. NS-713-212)
Unclassified report

DESCRIPTORS: *Noise, *Vibrations, *Damping, *Ship noise, *Structures, Textbooks, Ships.

Contents:
The concept of lumped damping
The concept of distributed damping
Noise control by damping
Methods of testing vibration-damping treatments
Vibration-damping materials and structures

AD-290 489 Div. 25
(TISTM/BRW) OTS price $2.60

Lessells and Associates, Inc., Boston, Mass.
BUCKLING AND FAILURE STRENGTH OF PLATING PANELS LOADED IN SHEAR. PART III: PRELIMINARY INVESTIGATION OF PANELS SUBDIVIDED BY TEE STIFFENERS.
Progress rept. no. 3.
1 May 60, 15p. illus. tables, 12 refs. (Technical rept. no. 602/s1(c))
(Contract NObs-72290, Proj. NS-731-037)
Unclassified report

DESCRIPTORS: *Beams, *Metal plates, Buckling, Shear stresses, Load distribution, Tests, Aluminum, Sheets, Failure (Mechanics).

The elastic critical shear buckling load was determined for clamped aluminum panels containing single central tee stiffeners. The panels were 0.050 in. thick, 30 in. long, and 6 in. wide between clamped edge and stiffener. Replaceable aluminum stiffeners, covering a range of torsional and flexural rigidity, were used. The stiffeners were bolted to the permanent base angles on the test panels. The observed critical stresses show a fair correlation with the critical stresses predicted from the solution developed by Crate and Lo. The test values were on the average 20% less than the computed values. The (comparatively light) stiffeners having proportions similar to those used in Naval construction provide something less than simple support to the panel; complete fixity was achieved only with very heavy tee sections. (Author)

AD-290 490 Div. 25
(TISTM/BRW) OTS price $2.60

Lessells and Associates, Inc., Boston.
BUCKLING AND FAILURE STRENGTH OF PLATING PANELS LOADED IN SHEAR. PART II: CALCULATION OF PANEL CENTERLINE SHEAR STRESS AS A FUNCTION OF APPLIED LOAD.
Progress rept. no. 2.
31 Mar 60, 22p. incl. illus. table, 3 refs.
(Technical rept. no. 602/s1(b))
(Contract NObs-72290, Proj. 731-037)
Unclassified report

DESCRIPTORS: *Beams, *Metal plates, Buckling, Shear stresses, Load distribution, Tests, Sheets, Steel, Aluminum, Mathematical analysis, Failure (Mechanics).

When a rectangular plate is loaded by shear forces along the two long edges only, equilibrium is usually assured by the development of high transverse forces at each corner. As a result, the shear forces on the panel centerline require some distance from the ends to build up, and at the center are therefore higher than the nominal applied shear stress. For panels whose length is five times the width, the actual center of panel shear stress has been shown by previous studies of perfectly clamped plates to be 4% above the nominal value. Tests on unstiffened panels showed the center of panel shear stress to be as much as 20% greater than the nominal. It is shown that the higher center of panel shear stress results from a slower buildup of shear stress at the ends than would be predicted from previous work. This reduction in rate of buildup is a consequence of slip between the test panel and test frame clamps. The ratio of actual to nominal shear stress is shown to be a function of coefficient of friction at the clamped faces, clamping stress, applied shear stress, panel aspect ratio, and panel width and thickness. (Author)

AD-290 510 Div. 25
(TISTP/FR) OTS price $4.60

Ordnance Research Lab., Pennsylvania State U., University Park.
GENERAL INSTABILITY OF CIRCUMFERENTIALLY STIFFENED SANDWICH SHELLS SUBJECTED TO UNIFORM EXTERNAL PRESSURE,
by J. D. Stachiw. 10 Dec 62, 13p. illus. 12 refs.
(Serial no. 91)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Structural shells, *Sandwich construction, Acrylic resins, Aluminum, Buckling, Hydrostatic pressure, Tests.

The Bresse equation for the buckling of rings under radial pressure is modified to predict the general-instability collapse pressure of cellular sandwich shells under hydrostatic pressure. The validity of the equation is demonstrated by implosion experiments with carefully designed cellular sandwich shells, the general-instability collapse pressures of which are compared with the results obtained by the modified Bresse equation. The results indicate that the modified equation predicts the general-instability collapse pressure of cellular sandwich shells within 5 per cent. This equation is recommended for use only when the ratio of shell ring depth to shell mean diameter is less than 0.1. (Author)

AD-290 525 Div. 25
(TISTP/TL) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
NON-SIMILAR NUMERICAL METHODS OF SOLUTION FOR ELECTRODE BOUNDARY LAYERS IN A CROSSED FIELD ACCELERATOR,
by Gerhard L. Grohs. Aug 62, 56p. incl. illus. 20 refs. (Rept. no. 63; D1-82-0192)
Unclassified report

DESCRIPTORS: *Boundary layer, *Numerical analysis, *Particles, *Plasma jets, *Electrodes, *Atoms, *Gases, *Plasma physics,

*Magnetohydrodynamics, *Gas flow, Ionization, Argon, Potassium, Kinetic theory, Heat transfer, Convection, Differential equations, Hall effect, Partial differential equations.

A numerical method of solution for the electrode boundary layer problem in a crossed-field plasma accelerator is presented, which allows a direct study of non-similar properties of the boundary layer profiles. It is applicable not only to a wide variety of free stream solutions with or without Hall-effect, but in essence to compressible boundary layers in general. Suggestions for a modification of the Karman-Pohlhausen integral technique have been discussed also. An evaluation of numerical results will be given upon conclusion of the present computations. (Author)

AD-290 560 Div. 25
(TISTP/TL) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RADIATION FROM SEMI-INFINITE SLOT-EXCITED PLASMA SHEATH CONFIGURATIONS,
by A. A. Oliner and T. Tamir. 17 May 62, 26p. incl. illus. 4 refs. (Research rept. PIBMRI-1029-62)
(Contract AF 19(604)4143, Proj. 5635)
(AFCRL-62-575) Unclassified report

DESCRIPTORS: *Plasma physics, *Slot antennas, Sheets, Electromagnetic waves, Antenna radiation patterns.

The technique of determining the radiation pattern from the leaky wave distribution has been applied to two semi-infinite different geometrical configurations, one in which the sheath is terminated while the metal plane continues, and the other where the metal conductor terminates in a right angle bend while the plasma sheath continues and also fills the quarter-space vacated by the metal. The patterns are computed from an integration over an assumed aperture distribution consisting of only the unperturbed leaky waves in the plane of the discontinuity. This distribution is approximate in that other (weaker) wave contributions are omitted, and edge effects due to the discontinuity are neglected. It is found that the major peak of the radiation patterns thus obtained is not appreciably affected by the finiteness. Some end-fire radiation is obtained now which was absent for the infinite case, and certain other characteristic differences occur. The above statements are illustrated by the radiation patterns for several cases, and a technique is outlined for qualitatively predicting the radiation features. (Author)

AD-290 591 Div. 25
(TISTP/FR) OTS price $2.60

California Inst. of Tech., Pasadena.
EFFECTS OF THERMAL CONDUCTION IN SONOLUMINESCENCE,
by Robert Hickling. Nov 62, 22p. illus. (Rept. no. 85-21)
(Contract Nonr-22028)
Unclassified report

DESCRIPTORS: *Luminescence, Gases, Bubbles, Underwater sound, Cavitation, Thermal conductivity.

Current experimental results indicate that sonoluminescence is largely thermal in origin, with the spectra showing a direct relation between luminous intensity and the temperatures generated inside the collapsing cavitation bubbles. The strong dependence of the luminous intensity on the nature of the gas dissolved in the liquid is explained in terms of thermal conduction. Provided the cavitation bubbles are sufficiently small, loss of heat from the bubble into the liquid can significantly reduce the temperatures attained during collapse, so that there is a consequent reduction in the luminous intensity. This process is demonstrated analytically by means of a numerical solution of the equations of motion of a gas inside a collapsing cavitation bubble. The agreement between the theory and the observed luminous intensities for different dissolved gases is good. (Author)

AD-290 619 Div. 25
(TISTP/WH) OTS price $6.60

Naval Ordnance Lab., White Oak, Md.
SOLID STATE RESEARCH OF THE APPLIED PHYSICS DEPARTMENT FOR THE YEAR 1961.
16 July 62, 54p. incl. illus. tables, refs.
(Rept. no. NOLTR 62-125)
Unclassified report

DESCRIPTORS: *Solid state physics, *Semiconductors, *Lasers, *Magnetic materials, *Silicon compounds, *Dioxides, *Tellurium alloys, *Lead alloys, *Tin alloys, Optics, Elasticity, Intermetallic compounds.

Emphasis has been placed upon the optical and electrical properties of the lead salt semiconductors and work on the compound SnTe. Surface transport studies of semiconductors were clarified by a reformulation of the Boltzmann equation. Magnetoelastic interactions constituted an important effort during the year. Acoustic investigations of SiO2 were continued with reference to the Si-O-Si bond that included the relationships between specific heat and temperature dependence of the elastic moduli of SiO2 glass. Laser mechanisms have been studied by the use of high speed photography. A new alloy, Nitinol, revealed many unusual properties. Certain device applications of solid state principles are reported. (Author)

AD-290 626 Div. 25, 15, 20
(TISTP/JW) OTS price $2.60

Syracuse U., N. Y.
THEORETICAL STUDIES OF IRREVERSIBLE AND RELATIVISTIC SYSTEMS.
Final rept., 1 Oct 58-1 Aug 62,
by Peter G. Bergmann. Aug 62, 19p.
(Contract AF 49(638)461, Proj. R 354-10-20)
Unclassified report

DESCRIPTORS: *Statistical functions, *Gravimetric analysis, Mechanical properties, Radiation effects, Motion, Test methods, Spin, Wave characteristics, Electromagnetic fields.

AD-290 640 Div. 25, 8
(TISTP/JW) OTS price $3.00

Physical Electronics Research Lab., Institute of Tech., U. of Minn., Minneapolis.
STUDY OF ELECTRICAL AND PHYSICAL CHARACTERISTICS OF SECONDARY EMITTING SURFACES.
Final rept., 16 Feb 59-15 Jan 62,
ed. by W. T. Peria. Oct 62, 176p. incl. illus. tables, 74 refs.
(Contract AF 33(616)6239, Proj. 4156)
(ASD TDR 62-707) Unclassified report

DESCRIPTORS: *Ion exchange, *Secondary emission, *Single crystals, Surfaces, Thin films, Electron bombardment, Electrons, Lattices, Magnesium compounds, Oxides, Measurement, Physical properties.

Vacuum techniques used in this laboratory are described as well as the methods used to measure secondary electron yields, to heat small parts in a vacuum and to clean surfaces by ion bombardment. Studies of the variation of secondary yield with angle of incidence of the primary beam are described for metal and for semiconducting crystals. In the case of titanium, the influence of such factors as primary energy, orientation of the crystals, heat treatment and exposure to gas are discussed. Similar results for tungsten and germanium are compared with the case of titanium. Measurements of the transmission and reflection secondary yield of an unbacked MgO film are presented. An experiment is described which shows that the color produced in MgO by electron bombardment extends throughout the whole crystal. Studies of the influence of a cesium overlayer on the secondary yield of MgO films are reported, with particular reference to the stability of the yield under electron bombardment. The effect of exposing such films to the atmosphere is also described. The results of an investigation of the optimum oxidation conditions for Mg-Ag alloy are presented. The thickness required for full unenchanced yield is given as well as the dependence of the enhancement effect on thickness. (Author)

AD-290 666 Div. 25
(TISTM/TCG) OTS price $1.10

Laboratory of Molecular Structure and Spectra, U. of Chicago, Ill.
(No title).
Final technical rept., 1 Apr 61-31 Mar 62,
by C. C. J. Roothaan. 31 Mar 62, 3p.
(Contract AF 49(638)1068)
Unclassified report

DESCRIPTORS: *Atoms, *Molecules, *Quantum mechanics, *Mathematical analysis, Ions, Excitation, Atomic energy levels, Rare earth elements, Atomic orbitals, Equations of state, Computers, Molecular structure, Spectrographic analysis, Test methods.

Techniques for performing quantum mechanical calculations on atoms and molecules were developed. A number of calculations on actual atomic and molecular systems were carried out. (Author)

AD-290 668 Div. 25
(TISTP/TL) OTS price $6.60

Laboratory of Molecular Structure and Spectra, U. of Chicago, Ill.
ATOMIC SELF-CONSISTENT FIELD CALCULATIONS BY THE EXPANSION METHOD,
by C. C. J. Roothaan and P. S. Bagus. 1962,
55p. incl. illus. tables, 19 refs.
(Contract AF 49(638)1068)
Unclassified report

DESCRIPTORS: *Atoms, *Molecules, *Atomic orbitals, *Quantum mechanics, *Programming, *Digital computers, Partial differential equations, Numerical analysis, Integration, Series, Determinants, Integral equations, Nuclear spins, Kinetic theory, Potential theory, Matrix algebra, Vector analysis.

Contents:
General theory
Calculation of integrals
Eigenvectors and eigenvalues
SCF iterations and extrapolations
Convergence control
Exponent variation
Output format and options
Input format and conventions
Limitations of the program

AD-290 673 Div. 25, 20
(TISTP/JW) OTS price $1.60

Illinois U., Urbana.
RESEARCH ON THE THEORY OF SUPERCONDUCTIVITY AND RELATED THEORETICAL PROBLEMS OF THE SOLID STATE.
Final technical rept.,
by J. Robert Schrieffer. 1 Oct 62, 12p. 3 refs.
(Contract AF 49(638)882, Proj. 9763)
Unclassified report

DESCRIPTORS: *Semiconductors, *Solid state physics, Bibliography, Phonons, Absorption, Electromagnetic fields, Excitation, Particles.

The research carried out under Contract AF 49(638)882 is summarized. The report will not go into great technical detail but will serve as a guide to publications and reports issued elsewhere. (Author)

AD-290 685 Div. 25, 20, 8
(TISTP/JW) OTS price $1.10

Westinghouse Electric Co., Pittsburgh, Pa.
A DEVICE FOR ACCURATE REPOSITIONING OF AN X-RAY DIFFRACTION GONIOMETER,
by G. F. Bolling. 8 Oct 62, 2p. illus.
(Scientific paper no. 62-944-116-P3)
(Contract AF 49(638)1029)
Unclassified report

DESCRIPTORS: *X ray diffraction analysis, *Goniometers, Instrumentation.

Certain x-ray diffraction experiments are performed in order to find comparative data, such as the shift of x-ray peaks due to changes in cold work or temperature. It is usually necessary, in these experiments, to traverse the large angular distances between x-ray peaks without resetting the goniometer to avoid the errors produced by repositioning. A simple device is described which eliminates this time-consuming traverse without loss of accuracy. (Author)

AD-290 686 Div. 25, 4
(TISTM/EJH) OTS price $1.10

Washington U., St. Louis, Mo.
(No title).
Final rept.,
by R. E. Norberg. 30 Sep 62, 8p.
(Contract AF 49(638)464, Proj. 9751)
Unclassified report

DESCRIPTORS: *Free radicals, *Nuclear spins, *Hyperfine structure, *Nuclear magnetic resonance, Electron transitions, Isotopes, Nitrogen, Carbon, Paramagnetic resonance, Electrons, Spin, Molecular spectroscopy, Hydrocarbons, Benzenes, Sodium, Ammonia, Solutions.

Contents:
Spin distributions
Rates and mechanisms
Clusters of free radicals
Endor studies
Multiple-frequency resonance

Division 25 - PHYSICS

AD-290 694 Div. 25, 30
(TISTM/BRW) OTS price $1.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
AN APPARATUS FOR OBTAINING X-RAY EXTINCTION MICROGRAPHS OF SINGLE CRYSTALS,
by R. K. MacCrone. 21 May 62, 13p. incl. illus. 4 refs.
(Contract AF 49(638)435)
Unclassified report

DESCRIPTORS: *Single crystals, Instrumentation, Lattices, X-ray photography.

An apparatus for obtaining X-ray extinction micrographs (Berg - Barrett micrographs) of single crystals is described. A simple method to orient the crystal for reflection for a predetermined plane is discussed. Finally, a selection micrographs illustrating the high resolution of the apparatus is presented. (Author)

AD-290 702 Div. 25
(TISTP/WH) OTS price $1.60

University Coll., London (Gt. Brit.).
ANGULAR CORRELATIONS IN LAMBDA BETA DECAY,
by L. Egardt. 11 Sep 62, 19p. incl. illus. table, 5 refs. (Technical note no. 10)
(Grant AF EOAR 62-3)
Unclassified report

DESCRIPTORS: *Beta decay, *Mesons, *Hyperons, *Nuclear reactions.

A current-current type of interaction is assumed with the conventional lepton current coupled to a general hyperon current involving 6 unknown form factors. The expression obtained for the electron proton angular correlation is to a large extent dominated by phase space and for reasonable assumptions about the form factors the angular distribution of electrons with respect to the proton momentum is always peaked in the backward direction. This also holds true for a scalar, pseudoscalar or a tensor interaction. Finally, some comments are made on the effect of an intermediate particle. (Author)

AD-290 722 Div. 25, 17
(TISTM/EJH) OTS price $9.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
THE VAPORIZATION KINETICS OF SOLID SILVER.
Final rept. on Evaporation of Silver Crystals,
by W. L. Winterbottom and J. P. Hirth.
1 Oct 62, 108p. incl. illus.
(Contract Nonr-76017, Proj. NR 036-046)
Unclassified report

DESCRIPTORS: *Silver, *Single crystals, *Crystals, *Vaporization, Reaction kinetics, Surfaces, Impurities, Temperature, Preparation, Crystal oscillators, Thermodynamics.

The rates of free vaporization of single crystals of silver were measured as a function of the crystallographic orientation of the vaporizing surface, the mode of surface preparation, the degree of contamination, and the temperature. The flux from the (111), (110), (100) and polycrystalline surfaces was continuously measured, and the concurrent morphological state of the surface was noted. The flux was measured throughout the period of vaporization by monitoring the fundamental frequency shift of an AT cut quartz oscillator positioned so as to intercept a known fraction of the flux from the vaporizing surface. The results indicate that the vaporization kinetics of single and polycrystalline surfaces with the degree of perfection corresponding to as-grown or annealed single crystals are essentially ideal and independent of the crystallographic orientation of the surface. Certain types of surface impurities are shown to markedly influence the kinetics of vaporization. (Author)

AD-290 724 Div. 25
(TISTP/WH) OTS price $4.60

Columbia U., New York.
THE EFFECT OF A MOVING LOAD ON A VISCOELASTIC HALF-SPACE,
by J. W. Workman and H. H. Bleich. Nov 62, 38p. illus. 13 refs. (Technical rept. no. 12; Rept. no. CU 1-62 ONR 266(34)-CE)
(Contract Nonr-26634, Proj. NR 064-417)
Unclassified report

DESCRIPTORS: *Elasticity, *Plasticity, *Integral transforms, *Loading, *Stresses, *Wave transmission.

Cole and Huth have studied the effect of a line load moving with constant velocity V along the surface of an elastic half-space. The present paper treats the equivalent problem for a viscoelastic (standard solid) material when the velocity V is less than the velocity cs of shear waves of high frequencies. No solution could be obtained when the velocity V was equal to the velocity of Rayleigh waves. The present analysis yields a solution for this special velocity. It also permits an evaluation of the effects of viscosity at other values of V. In certain ranges these effects are minor, but in other ranges major differences occur due to focusing phenomena. (Author)

AD-290 728 Div. 25, 7
(TISTP/WH) OTS price $5.60

DuPont de Nemours, E. I., and Co., Inc, Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 4, 1 Apr-30 June 62,
by W. T. Hicks and H. Valdsaar. 30 July 62, 32p. illus.
(Contract NObs-84824, Proj. SR-007-12-01)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Resistance, *Thermal conductivity, *Tungsten, *Antimony, *Selenium alloys, *Tellurium alloys, *Intermetallic compounds.

Seebeck coefficient, resistivity and thermal conductivity measurements were performed on tantalum-doped WSe2-type compositions containing mixed anions and/or cations; for example, W0.47Mo0.47Ta0.06SeTe. Such compositions had much lower thermal conductivities at room temperature than their less complex counterparts, but this advantage did not result in improved Figures of Merit, partly because electrical properties were inferior and partly because their high-temperature thermal conductivities approached that of WSe2. The tungsten-selenium-antimony phase diagram was found to contain no ternary phases of thermoelectric interest. Tantalum-doped tungsten diselenide thermoelements sealed in standard ceramic capsules were exposed to hot-end temperatures of 950 C for several hours without deterioration. Measurement of the thermoelectric parameters of NbSiGe in the 1000-1500 C range is in progress. (Author)

AD-290 738 Div. 25, 4
(TISTM/TCG) OTS price $5.60

Texas Instruments, Inc., Dallas.
RESEARCH AND DEVELOPMENT OF YTTRIUM IRON GARNET SINGLE CRYSTALS.
Final engineering rept. 1 July 61-30 June 62. 2 July 62, 55p. incl. illus. tables, 31 refs.
(Contract NObsr-87241, Proj. SR-0080302)
Unclassified report

DESCRIPTORS: *Single crystals, *Yttrium compounds, *Iron compounds, *Garnet, *Ferromagnetic materials, Oxides, Production, Thermal stresses, Fracture (Mechanics), Mixtures, Zone melting, Heat treatment, Dielectric properties, Cooling, Ferromagnetism, Crazing, Growth, Production.

Major emphasis was placed on refining the floating zone technique to produce single crystal yttrium iron garnets at least 1/2 in. in diameter and 1 in. long with a ferrimagnetic resonance line-width in the X-band frequency range of less that 1 oersted. Yttrium iron garnet (YIG) single crystals 1/4 to 3/8 in. diameter with a dielectric constant of about 10 and dissipation factor of 0.002 at 1000 cps have been produced by the floating zone technique. Ferrimagnetic resonance line-widths at X-band of 1.3 oersteds were obtained from polished test spheres. A technique has been developed by which several float-zoned specimens were produced with crack-free cross sections. A variety of techniques and accessory equipment were utilized to give a temperature profile along the axis of the zoned YIG that would prevent thermal crack formation. The most promising approach was one in which a bifilar wound Pt resistance furnace was placed below the rf work coil to produce a region of uniform elevated temperature. The single crystal YIG was moved into the furnace during zoning and, after completing crystal growth, slowly and uniformly cooled with the furnace. (Author)

AD-290 751 Div. 25
(TISTP/FR) OTS price $7.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
A MECHANISM FOR 1/F NOISE OF THIN EVAPORATED METAL FILMS,
by Martin Seymour Osman. Sep 62, 67p. incl. illus. tables, 29 refs. (Rept. ESL-R-149)
(Contracts AF 33(657)7644 and AF 33(616)7700)
Unclassified report

DESCRIPTORS: *Metal films, *Thin films, Gold, Electric currents, Electrons, Resistance, Measurement, Instrumentation.

Some observations of the salient characteristics of metal film noise, principally in gold films of less than 100 A thickness are made. (Author)

AD-290 752 Div. 25
(TISTP/TL) OTS price $9.60

Physical Electronics Research Lab., Inst. of Tech., U. of Minn., Minneapolis.
DETERMINATION OF DYNAMICS OF ELECTRON EMISSION FROM SOLIDS AS THE RESULT OF IMPACT.
Interim engineering rept. no. 1, 16 Jan-15 July 62,
by W. T. Peria. 15 July 62, 73p. illus. tables.
(Contract AF 33(657)8040)
Unclassified report

DESCRIPTORS: *Solids, *Electron bombardment, Secondary emission, Single crystals, Titanium compounds, Dissociation, Magnesium compounds, Oxides, Thin films, Germanium compounds.

Results are presented which show that it is necessary to sputter-clean titanium crystals in the study of the variation of secondary emission with the angle of incidence of the primary beam. The nature and cause of the errors introduced when titanium is not sputter cleaned are described. The asymmetrical structure observed in angular dependence studies of tungsten and germanium is shown to be caused by misalignment of the crystals and errors in the cutting of the crystal faces. It is also demonstrated that sputter cleaning is not necessary for angular dependence studies of tungsten. The techniques for production of unbacked gold films are described. Results of preliminary secondary emission experiments on one of these films are reported. Further results of studies of MgO films formed by the oxidation of a Mg film on a metal substrate are presented and analyzed. (Author)

AD-290 777 Div. 25
(TISTP/TL) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
ON THE SPIN CONTRIBUTION TO THE VERDET CONSTANT,
by J. Finkel. 24 July 62, 14p. 8 refs. (Rept. no. NOLTR 62-120)
Unclassified report

DESCRIPTORS: *Gases, *Magneto-optic-rotation, *Electromagnetic waves, *Magnetic susceptibility, Electromagnetic fields, Direct current, Quantum mechanics, Magnetic moments, Electrons, Nuclear spins, Partial differential equations, Vector analysis, Perturbation theory.

The Faraday rotation in a gas exhibiting an electric and magnetic susceptibility is shown to be proportional to the sum of two independent terms. One term is the difference between the real parts of the complex magnetic susceptibilities for right and left circularly polarized radiation, and the second term is the difference between the real parts of the complex electric susceptibilities for the two states of polarization of the radiation. From Hamiltonians containing the interaction of the spin magnetic moment of the electrons with the magnetic field of the radiation, the imaginary parts of the magnetic susceptibilities for right and left circular polarization are calculated. The dispersion relations appropriate to tensor media is then applied yielding the difference between the real parts of the magnetic susceptibilities for the two states of circular polarization. An expression is then derived for the magnetic susceptibility contribution to the verdet constant. For frequencies much greater than the Zeeman splitting this expression is frequency independent. It depends only on the concentration, temperature, and spin. It is suggested that this expression should be applicable to alkali vapors and orthohelium. (Author)

AD-290 780 Div. 25
(TISTP/WH) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
RADIATION BY A UNIFORMLY ROTATING POINT CHARGE,
by Manlio Abele. June 62, 29p. 18 refs.
(PIBAL rept. no. 753)
(Grant no. AF-AFOSR-1-63)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Cerenkov radiation, *Refractive index, *Particles, Spectrographic analysis, Rotation.

The spectral distribution of the radiation emitted by a uniformly rotating point charge in a dielectric medium is evaluated and compared to the Cerenkov radiation of a uniformly moving charge. Two particular cases of dispersive medium are analyzed. First the orbit of the charge is assumed to be enclosed in a perfectly conducting cylinder which acts as a mirror for the radiation; in the second case the charge rotates around a dielectric rod, and an analysis is conducted of the excitation of waves which propagate along the rod. (Author)

AD-290 787 Div. 25
(TISTP/WH) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
ANISOTROPIC EXCHANGE IN K3Fe(CN)6.
Semiannual technical rept., 1 Jan-30 June 62,
by M. Birnbaum. Oct 62, 5p. incl. table, 5 refs.
(Rept. no. TDR-69(2250-24)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-193)
Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Fourier analysis, *Nuclear magnetic resonance, *Potassium compounds, *Iron compounds, *Cyanides, *Magnetic fields.

A phenomenological analysis of anisotropic exchange by means of the Bloch equations indicates that odd harmonics of the driving frequency should appear in the resonance signal. A Fourier analysis is performed to evaluate the strength of the harmonics relative to the fundamental as a function of the intensity of the driving field. Very preliminary measurements with K3Fe(CN)6 indicate that liquid helium temperatures would be required for the observations. (Author)

AD-290 788 Div. 25
(TISTP/TL) OTS price $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
COOLING OF AN ANTIFERROMAGNET BY ADIABATIC MAGNETIZATION,
by J. H. Schelleng and S. A. Friedberg.
1 Nov 62, 5p. illus. 6 refs. (Technical rept. no. 14)
(Contract Nonr-76005, Proj. NR 018-301)
Unclassified report

DESCRIPTORS: *Antiferromagnetism, *Magnetism, Heat, Magnetic fields, Magnesium compounds, Borides, Chlorides, Hydrates, Titanium compounds, Cooling.

The heat capacity of powdered MnBr2.4 H2O has been measured between 1.4 and 20 K in applied magnetic fields up to 24 K oe. The shift of the Neel point to lower temperatures with increasing field has been observed. A series of adiabatic magnetization measurements from initial temperatures above and below the zero field Neel point (TN(O) = 2.13 K) has been carried out. For Ti < TN(O) the anticipated cooling effect is observed for applied fields smaller than that required to make the salt paramagnetic. Adiabatic data have been used to locate the curves of entropy vs. temperature computed from the heat capacity relative to the curve for H = O. (Author)

AD-290 789 Div. 25
(TISTP/WH) OTS price $3.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
INFLUENCE OF SPIN-ORBIT INTERACTION ON THE TRANSPORT PROCESSES IN FERROMAGNETIC NICKEL ALLOYS, IN THE PRESENCE OF A DEGENERACY OF THE 3D BAND,
by L. Berger. 30 Oct 62, 31p. incl. illus. 52 refs. (Technical rept. no. 15)
(Contract Nonr-76005, Proj. NR 018-301)
Unclassified report

DESCRIPTORS: *Nuclear spins, *Transport properties, *Brillouin zones, *Ferromagnetism, *Nickel alloys, *Hall effect, *Tensor analysis.

Assuming that two of the five branches of the 3d band intersect, it is shown that singularities result in the transport properties when such an intersection happens to pass at the Fermi level. The ferromagnetic anisotropy of resistivity $\Delta\rho/\rho_o$ (often called magnetoresistance effect) is expected to have a strong maximum; using Born approximation for impurity scattering, and simple models of the 3d and 4s bands, a detailed computation provides an order of magnitude of 20% for the value of $\Delta\rho/\rho_o$ at the maximum. On the other hand, assuming the validity of current theories of the extraordinary Hall conductivity γ_{HS} due to Smit or to Karplus and Luttinger, γ_{HS} may be expected to change sign. This is precisely the behavior of $\Delta\rho/\rho_o$ and γ_{HS} observed by Smit in Co-Ni and Fe-Ni alloys, for an electron concentration equal to 27.7 el./at.. (Author)

AD-290 799 Div. 25, 17
(TISTP/WH) OTS price $2.75

Boeing Co., Renton, Wash.
RESEARCH ON TECHNIQUES OF ESTABLISHING RANDOM TYPE FATIGUE CURVES FOR BROAD BAND SONIC LOADING.
Final rept., Apr 61-May 62 on Dynamic Problems in Flight Vehicles,
by J. R. Fuller. Oct 62, 1v. incl. illus. tables, 32 refs.
(Contract AF 33(616)8087, Proj. 1370)
(ASD TDR 62-501) Unclassified report

DESCRIPTORS: *Fatigue (Mechanics), *Sound, *Stresses, *Structures, *Airframes, *Statistical analysis, Acoustics, Loading, Test methods, Vibration.

Methods for establishing fatigue curves for broadband random loading were investigated. Specifically, the goal was to develop a rational method for estimating fatigue life on the basis of the results of carefully designed and conducted random load fatigue experiments on simple specimens. A previously developed concept for estimating the effects of stress interaction on fatigue life under programmed variable amplitude cyclic loading was extended on the basis of the random load fatigue life tests and the experimental statistical data reported herein. The approach was to absorb the trends indicated by the results of this experimental program, together with the results of other investigations, into an expression involving the constant cycle S-N relationship, the root-mean-square stress, and other simple parameters which could be derived from the random load stress power spectrum and from the appropriate stress frequency distribution. (Author)

AD-290 805 Div. 25
(TISTM/EJH) OTS price $3.60

David Sarnoff Research Center, Princeton, N. J.
HEXAGONAL MAGNETIC COMPOUNDS.

Quarterly rept. no. 5, 15 June-14 Sep 62, by Robert L. Harvey, Irwin Gordon, and R. A. Braden. 14 Sep 62, 29p. incl. illus. (Contract DA 36-039-sc-87433; Continuation of Contract DA 36-039-sc-78288)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Magnetic materials, *Paramagnetic crystals, Metallic crystals, Magnetic properties, Magnetic susceptibility, Microwave spectroscopy, Additives, Oxides, High frequency, Frequency, Cobalt alloys, Zinc alloys, Nickel alloys, Copper alloys, Arsenic compounds, Manganese compounds, Manufacturing methods, Heat treatment, Crystal structure.

Variation in the processing steps of the compound (Ni.3 Cu.7 Zn1.0)Y resulted in no appreciable change in the density or saturation magnetization over the experimental range. The microwave line width is appreciably dependent on the final firing temperature. At low temperatures the improvement in orientation induced by crystallite growth during the firing was insufficient. At very high firing temperatures increase in line width is thought to be due to a small chemical change. A critical amount of Zn, Ni, or Cu in (Co2)W substantially improved the high frequency properties. Replacing some Fe203 with Al203 in the compound (Co2)W resulted in inferior high frequency properties. Certain oxides added to (Co2)Z definitely improved the inherently poor permeability-temperature property. The addition of the proper amount of MnO or As203 to (Co2)Z resulted in a sample having a stable value of permeability over a considerable range of ambient temperature. The use of a small amount of MnO or PbO as the additive did not materially impair the high frequency properties. The addition of any of the fourteen additives to (Co2)Z increased the microwave line width. (Author)

AD-290 814 Div. 25
(TISTP/WH) OTS price $2.60

Aerospace Information Div., Washington, D. C.
MAGNETOCRYSTALLINE ANISOTROPY OF GARNETS AND ORTHOFERRITES. ANNOTATED BIBLIOGRAPHY (PRELIMINARY).
13 Nov 62, 21p. (AID rept. no. 62-188)
Unclassified report

DESCRIPTORS: *Garnets, *Ferrites, *Bibliography, *Metallic crystals, Crystals.

An annotated bibliography based on Soviet open-source materials covering the period from 1959 through the first half of 1962 is presented. The entries in the bibliography constitute a closely related group and are therefore arranged alphabetically by author. (Author)

AD-290 837 Div. 25
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON PLASMA ACCELERATION IN CROSSED ELECTRICAL AND MAGNETIC FIELDS,
by V. M. Sarychev. 1 Mar 62, 17p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-191 from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki 6:pp. 17-23, 1961)
Unclassified report

DESCRIPTORS: *Plasma physics, Acceleration, Magnetic fields, Electric fields.

The problem of plasma-stream acceleration in external constant crossed electrical and magnetic fields assuming the applicability of one-dimensional equations of continuous media was examined. Individual cases were studied: (1) flow with constant gas density along the channel and (2) flow in a channel of constant cross section at maximum plasma acceleration. An examination is made of the isothermal acceleration of a homogeneous stream of weakly ionized plasma in channels with limited angles of expansion in external constant crossed electrical and magnetic fields. The range of values of the dimensionless parameters corresponding to effective acceleration is determined. Solutions are made for problems on plasma acceleration in uniformly expanding channels at maximum acceleration and acceleration with constant efficiency. The maximum allowable values of M in effective acceleration are found. (Author)

AD-290 952 Div. 25
(TISTP/WH) OTS price $1.10

Rutgers U., New Brunswick, N. J.
MEASUREMENTS OF RELAXATION TIMES IN A COPPER TUTTON SALT AT LIQUID HELIUM TEMPERATURES.
Technical report,
by Richard T. Weidner. July 62, 10p. incl. illus. tables.
(Contract Nonr-40408)
Unclassified report

DESCRIPTORS: *Relaxation time, *Nuclear magnetic resonance, *Nuclear spin, *Paramagnetic salts, *Low temperature research, Copper, Zinc, Tables.

AD-291 011 Div. 25, 2
(TISTP/MAK) OTS price $.50

Watertown Arsenal Labs., Mass.
AN ANALYSIS OF CARBON CRYSTALLITE GROWTH KINETICS DURING GRAPHITIZATION.
Technical rept. on Materials for Solid Propellant Rocket Motors,
by Aram Tarpinian and Craig Tedmon. Nov 62, 16p. incl. illus. table, 11 refs. (Technical rept. no. WAL TR 851.5/1)
(Proj. 59332008)
Unclassified report

DESCRIPTORS: *Carbon, *Crystallization, *X-ray diffraction analysis, *Experimental data, Analysis, Graphite, Fourier analysis, Diffusion, Phase transition.

An analysis is made of the growth kinetics of carbon crystallites during annealing of a petroleum coke through the range of 2057 to 2727 C. A single activation energy of 90 kcal/mol was found for the growth process. (Author)

AD-291 017 Div. 25, 30
(TISTP/JW)

Laboratorio Nacional de Engenharia Civil, Lisbon (Portugal).
AUTOMATIC CALCULATION PROGRAMS FOR COMPLEX SURGE TANKS SYSTEMS,
by Pietro Guerrini. 1962, 17p. incl. illus. 5 refs. (Paper no. 60)
Unclassified report

Symposium on the Use of Computers in Civil Engineering, 1-5 Oct 1962, Laboratorio Nacional de Engenharia Civil, Lisbon, Portugal.

DESCRIPTORS: *Tanks, *Digital computers, Programming, Hydraulic systems, Pressure, Symposia, Display systems, Analysis.

The results of research concerning the calculation of systems of complex surge tanks by means of electronic digital computers are given. The criterion followed in preparing programs and the sub-routines foreseen to simplify the auxiliary computations are described. As a typical example, the paper presents the flow-chart of a program used for studying a hydraulic system consisting of a pressure tunnel with two surge tanks in series by means of an IBM 650 Digital Computer. (Author)

AD-291 018 Div. 25, 9, 30
(TISTP/JW)

Laboratorio Nacional de Engenharia Civil, Lisbon (Portugal).
A MATRIX PROGRAM FOR STRUCTURAL ANALYSIS,
by Anders Olsson. 1962, 4p. (Paper no. 61)
Unclassified report

Symposium on the Use of Computers in Civil Engineering, 1-5 Oct 1962, Laboratorio Nacional de Engenharia Civil, Lisbon, Portugal.

DESCRIPTORS: *Structures, *Matrix calculus, Symposia, Computers, Data processing systems, Data storage systems, Magnetic recording systems, Programming, Analysis.

A matrix interpretative program used in the analysis of indeterminate structures is discussed. The program is outlined for the Swedish computer FACIT EDB 3. The matrices are stored on the magnetic tape FACIT ECM 64 (known as the Caroussel Memory) giving a short access time when the matrices are treated. The representation of the matrices is in dehydrated form, which means that no zero-elements will be stored. This will save space and computing time. The program is working via a pseudo-coding system. Each pseudo-instruction gives a special matrix-operation. The instruction consists of a matrix-number and a matrix-operation code. (Author)

AD-291 048 Div. 25, 30
(TISTP/WH) OTS price $1.60

Northwestern U., Evanston, Ill.
COMPUTER PROGRAMS FOR ANALYSIS OF BROADENING OF DIFFRACTION PEAKS,
by R. J. De Angelis and L. H. Schwartz.
28 Nov 62, 10p. incl. illus. 4 refs. (Technical rept. no. 2)
(Contracts Nonr-122820 and SD-67)
Unclassified report

DESCRIPTORS: *X-ray diffraction analysis, *Fourier analysis, *Digital computers, *Programming.

Modern techniques for evaluation of the broadening of diffraction peaks involves determination of the Fourier coefficients of the broadened peak and those of an annealed standard. Correction for the effect of instrumental broadening is made by the method of Stokes. It is often desirable to apply this detailed analysis to many samples, but hand computations become long and tedious, even with the aid of Beevers-Lipson strips. Digital computer programs were written by the authors in Fortran language and successfully executed on IBM 650 and 709 machines. (Author)

AD-291 096 Div. 25
(TISTM/ODN) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
AN AUTOMATIC GUARD-RING TEMPERATURE CONTROLLER FOR THERMAL-CONDUCTIVITY MEASUREMENTS,
by Michael J. Sacco, Francis W. Botsch, and Alan H. Woodcock. Oct 62, 13p. incl. illus. 5 refs. (Technical rept. no. PR-7)
Unclassified report

DESCRIPTORS: *Temperature control, *Temperature sensitive elements, Heat transfer, Thermal conductivity, Thermopiles, Oscillator circuits, Control, Automatic, Operation, Measurement.

An automatic controller is described which maintains the guard ring at the same temperature as the hot plate in an apparatus for measuring thermal conductivity. Control is maintained in response to the signal from a 6-power thermopile, which actuates a commercial electronic null detector. The output of the null detector drives a commercial magnetic amplifier. Proportional control is obtained by superposing an oscillating signal, generated by a Wien-bridge oscillator, on the control signal, so that the control relay continually opens and closes with a period of about 5 seconds. An increase in the demand for power causes the closed intervals to become longer and the open intervals to become shorter. Opening or closing of the relay changes the power input by only about 2% when conditions suitable for making measurements exist. Temperature control to within ± 2 mdeg C can be achieved under favorable conditions. (Author)

AD-291 165 Div. 25, 12
(TISTM/REB) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE RADIATIVE PROPERTIES OF CARBON DIOXIDE CRYODEPOSITS AT 77 K,
by T. M. Cunningham, Jr. and R. L. Young. Dec 62, 22p. incl. illus. 15 refs. (Rept. no. AEDC TDR 62-165)
(Contract AF 40(600)1000, Proj. 8951)
Unclassified report

DESCRIPTORS: *Deposits, *Carbon dioxide, *Cryogenics, *Thermal radiation, Blackbody radiation, Metals, Calorimeters, Reflection, Spaceships, Satellite vehicles.

The results of an investigation to determine the effect of a carbon dioxide cryodeposit on the radiative properties of a metallic surface are presented. A calorimetric-type experiment is described. Data are presented for the total hemispherical reflectance versus the thickness of carbon dioxide frost formed on polished copper, a Parson's black surface, and on two surfaces which were partially polished copper and partially Parson's black. Of particular significance was the fact that a common reflectance value was not reached as the frost thickness increased. An explanation for this effect is given in terms of a selective absorption characteristic. (Author)

AD-291 172 Div. 25
(TISTP/WH) OTS price $3.60

Cruft Lab., Harvard U., Cambridge, Mass.
ELECTROMAGNETIC REFLECTION FROM SOUND WAVES II,

by Hans J. Schmitt and Tai Tsun Wu. 25 June 62, 22p. incl. illus. (Technical rept. no. 363)
(Contract Nonr-186626, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: *Underwater wound, *Electromagnetic wave reflections, *Perturbation theory.

The reflection of electromagnetic waves normally incident on the surface of a liquid supporting a spherical sound wave is discussed theoretically. The effect of Bragg reflection is neglected, and only the microscopic movement of the liquid surface is taken into account. Because of the periodic nature of the sound wave, the reflected electromagnetic signal contains frequency components that correspond to both the sum and the difference of the electromagnetic and acoustic frequencies. These two frequency components have quite different properties. The problem is treated by perturbation theory, and two special cases are examined in detail. (Author)

26. PRODUCTION AND MANAGEMENT

AD-289 850 Div. 26
(TISTB/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
INDUCTIVE ACCOUNTING,
by R. Gene Brown. Sep 62, 24p. incl. tables.
(Rept. no. P-2671)
Unclassified report

Presented at the Annual Meeting of the American Statistical Association, 10 Sep 1962, Minneapolis, Minn.

DESCRIPTORS: *Management engineering, Data processing systems, Decision making, Costs.

AD-290 249 Div. 26, 28
(TISTB/MS) OTS price $19.75

Georgia U., Athens.
STUDIES IN ORGANIZATIONAL EFFECTIVENESS,
ed. by Raymond V. Bowers. 1962, 326p. incl. illus. tables, refs.
Unclassified report

Contributions to Military Sociology from the 1949-54 contract research program of the Human Resources Research Institute, Air University.

DESCRIPTORS: *Management engineering, *Military organizations, Leadership, Perception, Production, Behavior, Effectiveness.

Contents:
Role Conflict as a Factor in Organizational Effectiveness: A field survey of staff-command relations under conditions of technological change
Role Ambiguity as a Factor in Organizational Effectiveness: A 'perceptual component approach' to the study of work role success: an analysis in terms of the First Sergeant in the Air Force
Morale and Human Relations Leadership as Factors in Organizational Effectiveness: An experimental study of data from fifty comparable squadrons
Members' Perceptions and Evaluations as Measures of Organizational Effectiveness: An exploratory survey of internal appraisals of factors relevant to mission accomplishment
The Role Succession Factor in Organizational Effectiveness: A conceptual framework and proposed research design for the study of executive succession in a major Air Force command

AD-290 472 Div. 26, 30
(TISTB/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON INCREASING THE OPERATING LIFE OF UNATTENDED MACHINES,
by I. S. Reed and D. E. Brimley. Nov 62, 20p. incl. tables, 4 refs. (Memo. no. RM-3338-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Management engineering, *Machines, Maintenance, Life expectancy, Failure (Mechanics), Automation, Automatic.

Two methods of using redundancy are compared to increase the mean life of such machines. The methods are: the duplication or multiplexing of complete units which are switched into operation successively to replace failed units, and the use of modules or sub-unit replacements of the machine which are switched into operation on the failure of individual modules. The results are given in three tables for convenience. Complete derivations of the equations used are given in the appendices, so that it is not necessary to study the references to understand the derivation processes. (Author)

AD-290 588 Div. 26
(TISTW/RD) OTS price $2.60

Cornell U. Sibley School of Mechanical Engineering, Ithaca, N. Y.
LIFETESTING TIME REQUIREMENTS TO ASSURE REQUIRED RELIABLE LIFE,
by Henry P. Goode. Oct 62, 16p. tables, 6 refs. (Technical rept. no. 9)
(Contract Nonr-40143)
Unclassified report

DESCRIPTORS: *Life expectancy, *Reliability, Sampling, Quality control, Statistical distributions, Statistical tests, Naval equipment, Tests, Failure (Mechanics), Electronic equipment, Statistical analysis.

A procedure and associated tables are given of factors for use in determining the minimum life-testing time required for sample items to provide assurance at a confidence level of 95% that the items in the lot or population from which the sample was taken meet the life requirements specified. The life quality of the lot or population is evaluated in terms of reliable life which is the life beyond which some specified proportion of the items will survive. Tables of factors are provided for three proportions or reliability [illegible]ices; .99, .90, and .50 (median life). In addition, another table of factors is provided for lot evaluation in terms of mean item life. The Weibull distribution is used as a failure model with the exponential distribution being included as a special case of the Weibull. Inspection of sample items is by attributes with the acceptance criterion being simply that no more than some specified number of items fail before the end of the minimum test time as computed by the use of the factors. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

AD-290 604 Div. 26, 17
(TISTM/BRW) OTS price $1.10

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING OF REFRACTORY METALS.
Progress rept. no. 9, 1 June-31 July 62,
by Harold L. McKaig, Jr. 16 Nov 62, 10p. incl. illus. tables.
(Contract NOw 61-0410-c)
Unclassified report

DESCRIPTORS: *Refractory materials, *Heat resistant alloys, *Ultrasonics, Niobium alloys, Molybdenum alloys, Titanium alloys, Welded joints, Shear stresses, Tensile properties, Foils, Sheets, Welding.

Preliminary conclusions regarding the weldability of 0.005-inch D-31 alloy foil are: (1) new D-31 possesses good ultrasonic weldability. Crack-free welds with good tensile-shear consistency can be made; (2) good ultrasonic welds can be attained over a considerable power range: 850 watts with the 0.25-inch spherical sonotrode-tip radius to 1600 watts with the 0.75-inch tip radius; weld strengths consistency is good, standard deviation is low; (3) the material is somewhat sensitive to clamping force; (4) D-31 seems to be sensitive to tip surface condition and to surface cleanliness; (5) although good welds may be made with low power and low clamping force, better consistency and higher-strength levels are obtained with higher power and higher clamping force; (6) welding slightly below minimum clamping force yields poor results; (7) the most suitable sonotrode-tip radius appears to be 0.5 inch; and (8) material quality appears to exert a paramount controlling effect on weld quality, strength level, and consistency. (Author)

AD-290 612 Div. 26
(TISTM/BRW) OTS price $14.50

Oklahoma State U. School of Mechanical Engineering, Stillwater.
STUDY IN THE FIELD OF FLUID CONTAMINATION AND THE FEASIBILITY OF EMPLOYING A SONIC METHOD FOR THE REMOVAL OF FOREIGN MATERIALS.
Rept. no. 1 on Fluid Contamination Project,
by A. G. Comer, O. L. Burchett, and Joel Gilbert.
Aug 59, 212p. incl. illus. tables, refs.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Hydraulic systems, *Hydraulic fluid filters, Contamination, Hydraulic fluids, Vibration, Purification, Feasibility studies.

Application of sonic energy to facilitate separation of a solid dispersion in a hydraulic fluid is a possible solution to the contaminant removal problem. However, further mixing of the solid dispersion and the hydraulic fluid can occur if cavitation is present. The correct frequency and sound intensity must be chosen so that a maximum number of collisions of the dispersed particles will take place in any time interval. This enables the dispersed particles to agglomerate at a rate which is related to the number of collisions per unit time. Therefore, careful control of the frequency and sound intensity is necessary. The energy needed to generate the sound wave can be electrical, mechanical, kinetic energy of the fluid, or vibratory energy from some external source tuned to a particular frequency provided the resulting intensity is correct and remains constant. (Author)

AD-290 719 Div. 26, 14, 30
(TISTM/EJH) OTS price $2.60

Forest Products Lab., Madison, Wis.
RESPONSE OF TIMBER JOINTS WITH METAL FASTENERS TO LATERAL-IMPACT LOADS,
by C. A. Jordan. Nov 62, 24p. incl. illus. table, refs. (Rept. no. 2263)
(In cooperation with Wisconsin U., Madison)
Unclassified report

DESCRIPTORS: *Wood, *Joints, Loading, Bolts, Metal screws, Studs, Density, Impact shock, Test methods, Test equipment.

Recent studies were made of two-member wood joints fastened with nails, bolts, or lag screws and subjected to lateral-impact loads. These studies established a relationship, which is independent of the type of metal fastener, between magnitude of impact force, joint slip, fastener diameter, and specific gravity of wood (Douglas-fir) members. Electronic instrumentation was employed to measure and record the instantaneous forces that were applied to joints in both pendulum and drop tests. Three types of fasteners were tested: Eight-, sixteen-, and thirty-penny nails: 1/4-, 1/2-, and 3/4-inch bolts; and 5/16-, 1/2-, and 3/4-inch lag screws. The work was done in cooperation with the U.S. Air Force, and will be the basis for revised load ratings for metal fasteners in a new blocking and bracing guide. (Author)

AD-290 750 Div. 26
(TISTM/BRW) OTS price $15.00

General Mills, Inc., Minneapolis, Minn.
REMOTE HANDLING TECHNOLOGY AND EQUIPMENT INVESTIGATION.
Phase I report for Nov 62,
by Raymond S. Karinen, Robert Sullivan and others. Nov 62, 222p. incl. illus. tables, 226 refs. (Rept. no. 2332)
(Contract AF 29(601)5219, Proj. 8171)
(AFSWC TDR 62-117) Unclassified report

DESCRIPTORS: *Reactor safety systems, *Industrial equipment, *Remote control systems, Automation, Handling, Materials, Bibliography, Human engineering.

This Phase I report is the result of an extensive search of existing technical literature plus personal and letter contacts of many of the major remote handling equipment suppliers throughout the United States. The report presents a general description of the types of remote handling equipment in existence, illustrations and specifications of standard manipulators available, lists of remote handling equipment manufacturers throughout the world and a comprehensive bibliography of available literature. Technological progress and advanced developmental concepts in the field of remote manipulation are also presented. (Author)

AD-290 825 Div. 26, 14
(TISTM/EJH) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-patterson Air Force Base, Ohio.
PRODUCTION ADAPTABILITY OF PLASTIC PRODUCTS,
by Z. F. Urazayev, B. M. Baranov and others.
29 Oct 62, 86p. incl. illus. tables, 19 refs.
(Trans. no. FTD-TT-62-249 from Tekhnologichnost' Konstruktsii Izdeliy Iz Plastmass, RTM-814, 1957)
Unclassified report

DESCRIPTORS: *Plastics, *Manufacturing methods, *Molding, *Machining, *Handbooks, Industrial production, Instrumentation, Aircraft, Radar stations, Machines, Design, Thermosetting resins, Resins, USSR, Plastics.

This technical handbook is intended for designers as a guide in the design of plastic articles with good production adaptability. The recommendations given in the present material apply to all plastic articles used in aviation instruments and machinery sets and in radar stations. (Author)

AD-290 948 Div. 26, 9
(TISTA/GEC) OTS price $1.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EVALUATION OF A GAS BEARING PIVOT FOR A HIGH AMPLITUDE DYNAMIC STABILITY BALANCE,
by A. E. Hodapp, Jr. Dec 62, 13p. incl. illus. 1 table, 3 refs. (Rept. no. AEDC TDR 62-221)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Gas bearings, *Journal bearings, Load distribution, Dynamics, Stability, Damping, Frequency, Balances, Tests, Measurements, Calibration, Oscillation, Transducers, Design, Mathematical analysis, Wind tunnel models, Model tests.

The load capacity and damping level of a gas journal bearing are presented. Experimental data indicate that the bearing is capable of supporting radial loads in excess of 300 lb and that the damping parameter has some inverse relationship to frequency which is determined by the radial load. It is shown that the damped motion of the gas bearing can be approximated adequately with the viscous-damping equation. (Author)

AD-290 951 Div. 26, 1
(TISTA/GEC) OTS price $8.10

RAND Corp., Santa Monica, Calif.
DERIVATION OF ESTIMATING RELATIONSHIPS: AN ILLUSTRATIVE EXAMPLE,
by G. H. Fisher. Nov 62, 83p. incl. illus. tables (Memo. no. RM-3366-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Airframes, Least squares method, Production, Fighters, Bombers, Machine tools, Analysis of variance, Costs.

Illustrative examples of how statistical regression analysis may be used to derive estimating relationships from historical data are presented. The specific illustration pertains to estimating relationships for airframe initial tooling cost as a function of aircraft performance and physical characteristics. Examples of simple linear regression, logarithmic linear regression, second degree regression, and multiple linear regression analyses are presented and discussed. (Author)

AD-291 149 Div. 26, 17
(TISTM/REB) OTS price $6.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 9, 26 Sep-25 Nov 60,
by W. A. McNeish. 25 Nov 60, 56p. incl. illus. tables.
(Contract NOa(s) 59-6142-c)
Unclassified report

DESCRIPTORS: *Molybdenum, *Molybdenum alloys, Rolling mills, Metals, Alloys, Titanium alloys, Melting, Mechanical properties, Processing Sheets.

Mo+0.5%Ti ingots produced by various arc melting practices were evaluated for chemical quality. Sheets produced from these ingots were evaluated for gage variations and room temperature mechanical properties. Three additional Mo+0.5%Ti ingots were melted reproducing the melting variations. Upset testing of Mo+0.5%Ti and TZM at high temperatures in InFab were initiated. Work is continuing on the development of an extrusion practice for large billets of TZM alloy. (Author)

27. PROPULSION SYSTEMS

AD-289 619 Div. 27
(TISTM/ODN) OTS price $1.10

Redstone Div., Thiokol Chemical Corp., Huntsville, Ala.
ORDNANCE MATERIALS RESEARCH OFFICE CASE EVALUATION.
Quarterly interim technical rept., 22 June-22 Sep 62.
20 Nov 62, 6p. incl. illus. (Rept. no. 31-62)
(Contract DA 01-021-ORD-11919)
Unclassified report

DESCRIPTORS: *Rocket cases, Rocket motors, Materials, Tests, Research program administration, Design.

Drawings of the modified M-60 rocket motor case assembly incorporating the Borg-Warner helical-wrapped cylindrical section are presented. A brief discussion of program objectives and test plan procedures including physical, chemical, and metallurgical tests, environmental, hydraulic, and aging tests, and static firing tests is included.

AD-289 662 Div. 27, 17
(TISTM/ODN) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Progress rept. no. 22, 1 Sep-31 Oct 62,
by Gerald M. Gordon and David A. Brown. 1 Nov 62, 14p. incl. illus.
(Contract NOrd-18619)
Unclassified report

DESCRIPTORS: *Rocket motors, *Tungsten, Solid rocket propellants, Plasma jets, Thermal stresses, Shock, Test equipment, Exhaust gases, Photographic analysis, Carbon dioxide, Simulation, Materials, Erosion.

This report concerns the use of W in solid propellant rocket motors and involves two main areas of interest. The first area, W erosion, is being studied under simulated exhaust conditions by means of a specially constructed plasma arc erosion apparatus. The second area deals with the effects of thermal shock on W and includes an experimental and theoretical analysis of the problem. (Author)

AD-289 681 Div. 27
(TISTW/RD) OTS price $5.60

Aerojet-General Corp., Sacramento, Calif.
HEAT TRANSFER AND PARTICLE TRAJECTORIES IN SOLID-

ROCKET NOZZLES,
by L. P. Travis. 19 Oct 62, 99p. incl. illus. table (Rept. no. 0162-01TN-17)
(Contract AF 33(600)36610)
(AFBSD TDR 62-165) Unclassified report

DESCRIPTORS: *Rocket motor nozzles, Erosion, Solid rocket propellants, Gas flow, Exhaust gases, Heat transfer, Particle trajectories.

Particles present in the exhaust products of solid propellants to which aluminum was added impinge on the walls of the rocket nozzles, transfer heat to the walls, and erode portions of the nozzles. To analyze the effect of impingement, new techniques were developed for calculating three-dimensional particle trajectories and for determining the effects of these particles on heat transfer and erosion in a rocket nozzle. Methods are presented for determining approximate particle trajectories in the subsonic portions of the nozzle by use of an analog computer and for obtaining more accurate digital-computer solutions that can be applied to both the subsonic and supersonic portions. The particle-trajectory studies show that impingement is most severe at the throat region of the nozzle and at the outboard side of the exit cone for multiple-nozzle motors. General equations of motion are presented suggesting nozzle geometries to minimize particle impingement. (Author)

AD-290 055 Div. 27, 1
(TISTA/GEC) OTS price $9.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM STRUCTURAL ANALYSIS, VOLUME I,
by J. Needham, L. Erle and D. W. Nicholls. Mar 62, rev. June 62, 1v. incl. illus. tables (Rept. no. 285-13 (62-13))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Design, Analysis, Load distribution, Pressure, Helicopter blades, Ducts, Shear stresses, Deformation, Alloys, Mathematical analysis, Fatigue (Mechanics), Structure.

The structural design and analysis for the Hot Cycle Rotor System is presented. The report is divided into three volumes as follows: Volume I-Structural Criteria, Materials Selection, Weight Analysis, and Design Loads; Volume II-Rotor Blade Structural Analysis; and Volume III-Rotor Hub Structural Analysis and Control System Analysis. The primary objective of the design was to produce a rotor system which, through whirl testing and fatigue testing, would prove the feasibility of the Hot Cycle concept. Structural Analysis provides analytical substantiation of the structural components both for maximum maneuver conditions and for repeated fatigue loading.
(Author)

AD-290 056 Div. 27, 26,1
(TISTA/GEC) OTS price $3.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM MATERIALS AND PROCESSES,
by W. W. Jarrett, W. H. Jones and R. E. Katherman. Mar 62, 1v. incl. illus. tables (Rept. no. 285-18 (62-18))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Temperature, Materials, Microstructure, Seals, Titanium, Carbon, Grains (Metallurgy), Spot welding, Design, Helicopter blades, Pressure, Manufacturing methods.

The important aspects of the materials and processes developed and used in the fabrication of the Hot Cycle Rotor System. The 1200 F temperature and 25 psig pressure of the gases ducted from the fuselage area to the blade tips requires considerable attention to selection of materials and development of processes for use on those components exposed to or directly affected by the gases. Every effort was made to confine the high temperature to the duct system in such a way as to permit use of conventional structure and existing fabrication techniques. In some cases, however, pioneering work was done in the adaption of relatively new materials and in extension of the state-of-the-art of some existing fabrication methods. (Author)

AD-290 057 Div. 27, 1
(TISTA/GEC) OTS price $8.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM ENGINE-ROTOR CONTROL STUDY,
by R. J. Sullivan. Mar 62, 1v. incl. illus. tables, 18 refs. (Rept. no. 285-19 (62-19))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Gas generator engines, Gas turbines, Design, Tests, Automatic pilots, Helicopter blades, Aerodynamics, Stability, Jets, Fuel systems, Frequency, Mathematical analysis, Equations, Motion, Control systems.

A study was made of the engine-rotor control system for a hot cycle rotor powered by 2 General Electric T64 gas generators. The study included a comparison of the techniques currently used for governing free turbine turboshaft engines both in single and dual installations. All of the free turbine turboshaft engines investigated, including the T64, have droop-stabilized governors to provide essentially constant rotor rpm. Each governor has within it 2 flyball-type governors, one to measure and control free turbine or rotor speed, and the other to measure and control gas generator speed or engine power. The value of governed rotor speed is selected by the pilot by movement of a cockpit rotor speed selector lever which changes the reference load on the free turbine speed governor. Engine output power is selected indirectly by the aircraft controls by means of increasing or decreasing the load on the engine (i.e., helicopter rotor collective pitch). The free turbine or rotor speed governor controls the gas generator speed governor to match engine power to load power and thus maintain rotor speed essentially constant. (Author)

AD-290 058 Div. 27, 1
(TISTA/GEC) OTS price $7.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM - RESULTS OF STATIC TEST PROGRAM - GAS FLOWS AND TEMPERATURES,
by D. L. Jones and J. W. Rabek. Feb 62, rev. June 62, 69p. incl. illus. tables (Rept. no. 285-9-7 (61-79))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Gas generating systems, Ducts, Thrust, Exhaust nozzles, Velocity, Gas turbines, Pressure, Compressors, Design, Helicopter blades, Aerodynamics, Gas flow, Temperature.

An aerothermal survey (test and analysis) is presented of the Hot Cycle whirl test system under static conditions and includes a tether test, hub cooling test, and J57 gas generator calibration. Emphasis is placed on correlation of test data with earlier derived values used in performance predictions. In general, agreement between predicted and measured values of duct losses, nozzle coefficients and tip thrust was realized. Most significant, the tip nozzle effective velocity coefficient, directly proportional to tip thrust, was measured to be 0.98, 2.5% better than predicted. Hub cooling is shown to be satisfactory and no overtemperaturing of hub or spar components has been encountered. The normal engine operating line, including turbine discharge pressure and temperature versus high pressure compressor rpm, has been established. Also, exhaust valve controlled "off-line" turbine discharge temperatures have proven to be sufficient to meet contractual requirements. (Author)

AD-290 072 Div. 27
(TISTM/ODN) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. PLASMA ACCELERATION BY A TRAVELING MAGNETIC FIELD,
by R. X. Meyer. 1962, 2p.
Unclassified report

DESCRIPTORS: *Symposia, *Propulsion, Magnetic fields, Plasma jets, Hydrogen, Gas ionization.

A brief discussion is presented of some basic considerations, design features and results pertaining to the traveling-magnetic-field plasma accelerator described previously in two papers by Mayfield et al. (Mayfield, E. B. and Head, R. M., Plasma Propulsion; Proceedings of the National Aeronautical Electronics Conference, 1960; and Mayfield, E. B., Meyer, R. X., Head, R. M. and Huddlestone, R. H., Plasma Propulsion by Means of a Helical Transmission Line, Electric Propulsion Conference American Rocket Society, 1962.) (Author)

AD-290 073 Div. 27
(TISTA/SEB) OTS price $2.60

AVCO Everett Research Lab., Mass.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. ELECTROSTATIC ACCELERATION OF NEUTRAL PLASMAS - MOMENTUM TRANSFER THROUGH MAGNETIC FIELDS,
by G. S. Janes and T. Wilson. 1962, 27p. incl. illus. 19 refs.
(Contract AF 49(638)659)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electric propulsion, Electrostatic accelerators, Magnetic fields, Energy, Acceleration, Symposia, Mathematical analysis, Theory, Design, Propulsion.

Electrostatic plasma accelerators which avoid the space charge limitations of conventional ion rockets are described. In cylindrical and annular geometries, neutral plasmas can exhibit axial acceleration under the influence of externally applied axial electrostatic fields in the presence of radial magnetic fields. Ions will accelerate freely in the presence of such an axial electric field if both the ion gyro radius and the ion mean free path are large relative to the apparatus size. The axial drift of electrons, however, will be strongly inhibited by the radial magnetic field if the electron gyro radius is small relative to both the apparatus size and to the electron mean free path. The resulting circumferential drift of electrons constitutes an electric current which in turn produces a magnetic reaction force on the external field coils. The electric field is impressed upon the plasma by means of an upstream anode and a downstream cathode. This cathode serves as a source of electrons for space charge neutralization of the exit plasma beam. (Author)

AD-290 074 Div. 27
(TISTA/SEB) OTS price $1.60

General Dynamics/Astronautics, San Diego, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION, CINCINNATI, OHIO, OCTOBER 2-4, 1962. IMPULSIVE MHD DEVICES AS SPACE ENGINES,
by R. H. Lovberg. 1962, 11p. incl. illus.
Unclassified report

DESCRIPTORS: *Electric propulsion, *Magnetohydrodynamics, Plasma physics, Acceleration, Theory, Kinetic energy, Temperature, Electrons, Gases, Design, Spaceships, Accelerators, Symposia, Propulsion.

Theory and practical effects impulsive accelerators are discussed. The method of acceleration, MDH instabilities, and electrical parameters are described.

AD-290 075 Div. 27
(TISTA/SEB) OTS price $2.60

National Aeronautics and Space Administration, Washington, D. C.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION, CINCINNATI, OHIO, OCTOBER 2-4, 1962. THE ELECTRON - BOMBARDMENT ION ROCKET,
by Harold R. Kaufman. 1962, 20p. incl. illus. 14 refs.
Unclassified report

DESCRIPTORS: *Electric propulsion, *Ion rockets, Electron bombardment, Effectiveness, Thrust, Design, Magnetic fields, Cathodes, Symposia, Theory.

Research on the electron-bombardment ion rocket has progressed far enough to permit evaluation of the research problems. The two major obstacles to efficient long-life operation have been the accelerators and the cathode. The nature of the accelerator erosion problem is understood, and the research in this area is nearly completed. Although the cathode area has not progressed as far, two very efficient designs are being studied - at least one of which should reach a year's lifetime. Firm estimates of expected performance show power requirements as low as 150 kw/lb of thrust at reasonable specific

impulses. The research on the basic engine is nearing completion, and a shift of effort to system problems involving a number of engine modules should occur during the coming year. (Author)

AD-290 076 Div. 27, 12
(TISTA/SEB) OTS price $2.60

Ion Physics Corp., Burlington, Mass.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. CONDENSATION COLLOID PROPELLANTS FOR ELECTROSTATIC PROPULSION,
by A. Lucille Cox. 1962, 23p. incl. illus. 4 refs.
(Contract AF 33(657)8743)
Unclassified report

DESCRIPTORS: *Electric propulsion, *Ion rockets, Colloids, Ionization, Gases, Sodium, Mercury, Electric arcs, Condensation, Symposia, Electrostatic generators.

The concept of a condensation colloidal ion source for use in electrostatic propulsion engines is presented. To produce a beam of particles with a homogeneous charge-to-mass ratio, a retarding field controls particle growth by regulating the velocity of the colloidal ions through a growth region. The operating conditions and propellant properties required for the proper operation of this source are discussed. Experimental studies include examination of charge-to-mass ratios, beam collimation and various types of ionizers. (Author)

AD-290 077 Div. 27, 12
(TISTA/SEB) OTS price $8.10

General Electric Co., Cincinnati, Ohio.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. LARGE TURBO-NUCLEAR SPACE POWER SYSTEMS,
by M. A. Zipkin. 1962, 31p. incl. illus. table.
Unclassified report

DESCRIPTORS: *Ion rockets, *Electric propulsion, Radiators, Heat exchangers, Turbines, Generators, Shielding, Design, Thermodynamics, Fluid flow, Nuclear power plants, Symposia.

Contents:
One-megawatt power system
  Configuration (Reactor and shielding, Radiator, Power conversion units, and Propulsion engines and payload)
  Thermodynamics of system
  Component design (Heat exchanger boiler, Main turbogenerator, Jet condenser, and Waste heat radiator)
  System weight
Advances in basic technology
  Materials
  Two-phase fluid characteristics (Alkali metal boiling, and Flow stability)
  Bearings
  Seals
Component development programs (Turbine, Pumps, and Boiler)

AD-290 084 Div. 27, 12
(TISTA/SEB) OTS price $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. FEASIBILITY OF INTERSTELLAR TRAVEL,
by Dwain F. Spencer and Leonard D. Jaffe. 1962, 25p. incl. illus. tables, 16 refs.
Unclassified report

DESCRIPTORS: *Nuclear propulsion, Fission, Feasibility studies, Space flight, Velocity, Photons, Deuterium, Theory, Mathematical analysis, Equations, Symposia.

On a purely theoretical basis, staged vehicles using fission or fusion propulsion systems are capable of performing interstellar missions with flight times of less than 50 years. Specific consideration of a fusion propulsion system indicates that probe flight times of 50 years are reasonable to a 5 light year star. However, engineering problems associated with these vehicles, in particular the size of the radiator required to dump the energy escaping the fuel, may limit their capability unless some method can be devised to minimize this energy loss. (Author)

AD-290 085 Div. 27, 12
(TISTA/SEB) OTS price $2.60

Hughes Research Labs., Malibu, Calif.
THIRD SYMPOSIUM ON ADVANCED PROPULSION CONCEPTS SPONSORED BY UNITED STATES AIR FORCE OFFICE OF SCIENTIFIC RESEARCH AND THE GENERAL ELECTRIC COMPANY FLIGHT PROPULSION DIVISION CINCINNATI, OHIO, OCTOBER 2-4, 1962. FUSION PLASMA PROPULSION SYSTEM,
by William I. Linlor and Milton U. Clauser. 1962, 20p. illus.
Unclassified report

DESCRIPTORS: *Nuclear propulsion, *Plasma physics, Symposia, Rocket propulsion, Photoelectric effect, Photons, Magnetic fields, Gases, Dissociation, Helium, Hydrogen, Lithium, Vaporization, Exhaust gases, Heating, Enthalpy, Nuclear power plants, Spaceships, Plasma jets, Propulsion.

The theory, feasibility, and practicability of a fusion plasma propulsion system is discussed.

AD-290 212 Div. 27, 1
(TISTA/GEC) OTS price $9.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM DETAIL DESIGN OF ROTOR,
by E. Sallows and O. Plowe. Mar 62, 110p. incl. illus. tables, refs. (Rept. no. 285-12(62-12))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Design, Helicopter blades, Specifications, Military requirements, Ducts, Aerodynamic configurations.

The detailed structural and mechanical design is presented of the Hot Cycle Rotor System. The rotor system consists of a free-floating hub and three coning blades mounted on a shaft supported by an upper radial bearing and a lower thrust bearing. These bearings are positioned above the whirl tower (or fuselage) by a steel tubular truss. (Author)

AD-290 213 Div. 27, 1
(TISTA/GEC) OTS price $11.50

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM. VOLUME III. HUB AND

CONTROL SYSTEM STRUCTURAL ANALYSIS,
by J. Needham, L. Erle and D. W. Nicholls.
Mar 62, 154p. incl. illus. tables, 17 refs.
(Rept. no. 285-13(62-13), vol. 3)
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Structures, Analysis, Ducts, Design, Load distribution, Mathematical analysis, Control systems.

Contents:
Rotor hub structural analysis
Hub analysis
Hub ducts
Main rotor shaft
Control system structural analysis
Control system loads
Structural analysis

AD-290 214 Div. 27, 1
(TISTA/GEC) OTS price $5.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM FABRICATION EFFORT,
by J. T. Doyle. Mar 62, 51p. incl. illus. 4 refs.
(Rept. no. 285-15(62-15)
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Production, Design, Helicopter blades, Structures, Manufacturing methods.

The method of fabrication of the rotor, test machines and fabrication jigs and fixtures for the Hot Cycle Rotor System are presented. The design utilizes components, fabrication and assembly methods, and processes well established in the aircraft industry. In particular, the blade is composed of many identical small parts which are fabricated on existing high production machinery. Thus the design lends itself to fabrication of service craft at an early date and with minimum effort and cost. (Author)

AD-290 234 Div. 27
(TISTA/GEC) OTS price $7.60

Solar, San Diego, Calif.
REGENERATOR CORE MODULE THERMAL TESTS - T-600 ENGINE,
by N. Ackerman. 18 Apr 62, rev. 25 Oct 62, 1v. incl. illus. tables, 8 refs. (Rept. A to rept. no. ER-1221)
(Contract NObs-84534)
Unclassified report

DESCRIPTORS: *Gas turbines, *Heat exchangers, Heat transfer, Gas flow, Friction, Exhaust gases, Pressure, Test methods, Instrumentation, Injection.

The heat transfer and flow friction characteristics for the T-600 regenerator are described. Background, test apparatus, instrumentation, rig operation, method of data analysis, discussion of test surfaces, results, and conclusions are included. (Author)

AD-290 284 Div. 27, 1
(TISTA/GEC) OTS price $7.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM RESULTS OF COMPONENT TEST PROGRAM.
Final rept.,
by G. D. Deveaux. Mar 62, 1v. incl. illus. tables (Rept. no. 285-9-8 (62-8))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Helicopter blades, Ducts, Bearings, Fatigue (Mechanics), Seals, Test methods, Design, Titanium, Fracture (Mechanics), Test equipment, Frequency, Resonance, Oscillation.

Component tests were conducted on the Hot Cycle Rotor System. The blade fatigue test, after modifications, gave a satisfactory service life. The articulate duct outboard seal test and the blade flapping-feathering bearing wear test indicated satisfactory service life with negligible wear and leakage. The two segment duct sealant test demonstrated the ability of the RTV-601 silastic rubber compound to withstand the pressure and thermal environments of the Hot Cycle Rotor System. (Author)

AD-290 285 Div. 27, 1
(TISTA/GEC) OTS price $18.00

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM WHIRL TESTS,
ed. by K. B. Amer. Mar 62, 1v. incl. illus. tables, refs. (Rept. no. 285-16 (62-16))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Design, Gas turbines, Exhaust gases, Jets, Exhaust nozzles, Helicopter blades, Temperature, Pressure, Ducts, Friction, Velocity, Effectiveness, Aerodynamic data, Aerodynamics, Gas generator engines, Tests.

The results of a 60 hr whirl test program conducted on the Hot Cycle Pressure Jet Rotor System is presented. The system is based on a principle wherein the exhaust gases from high pressure ratio turbojet engine(s) located in the fuselage are ducted through the rotor hub and blades and are exhausted through a nozzle at the blade tips. Forces thus produced drive the rotor. The structural feasibility of the system has been more than demonstrated by 60 hr of whirl testing accomplished with no significant problems. The final 25 hr of the whirl test program have been conducted with no substitution or alteration of any components. The spectrum of test conditions agrees very closely with the conditions called for in the military specifications for rotor and engine preflight tests. No dynamic problems have evidenced themselves, in confirmation of the prediction of no resonances in the operating rotor speed range. The measured temperatures for all components have been within design limits. The measured loads have generally been within design limits. The two primary parameters required to predict Hot Cycle performance, duct friction coefficient and nozzle velocity coefficient, have been verified. (Author)

AD-290 286 Div. 27, 1
(TISTA/GEC) OTS price $9.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE DESIGN AND DEVELOPMENT PROGRAM.
Technical summary rept.,
by S. J. Chris. Mar 62, rev. June 62, 1v. incl. illus. tables, refs. (Rept. no. 285-17 (62-17))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Feasibility studies, Research program administration, Helicopter blades, Tests, Vertical take-off planes, Transports, Helicopters, Aerodynamics, Test methods, Ducts, Fatigue (Mechanics), Thrust, Lift, Design.

The feasibility of the Hot Cycle Rotor concept of helicopter propulsion was evaluated. The Hot Cycle Rotor system utilizes high pressure, high temperature gases, supplied by turbojet engine(s) mounted in the fuselage for propulsion. These gases are ducted through the rotor blades to the tips, where they are exhausted tangentally to produce the thrust to drive the rotor. All drive gearing and shafting is eliminated, and the rotor serves as a power turbine in addition to its basic function. The tip jet drive of the Hot Cycle results in negligible torque reaction, thus eliminating the need for a second rotor - only a small jet is required at the tail for yaw control at low speeds. (Author)

AD-290 287 Div. 27, 1
(TISTA/GEC) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
PERFORMANCE CALCULATION METHOD FOR A HOT CYCLE ROTOR,
by R. J. Sullivan. Mar 62, 20p. incl. illus. 8 refs. (Rept. no. 285-20 (62-20))
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Jet helicopter rotors, Effectiveness, Equations, Thrust, Digital computers, Gas generator engines, Exhaust gases, Design, Aerodynamic configuration, Ducts, Helicopter blades, Friction, Pressure, Mathematical analysis.

Equations are developed which permit computation of hovering rotor thrust for the hot cycle jet driven rotor used in the rotor whirl tests. These equations permit numerical evaluation of rotor performance on a digital computer, starting from gas generator discharge conditions and rotor geometry. The procedure employs classical thermodynamic relationships as extended by NASA to apply to a rotating blade, plus standard helicopter performance computation procedures. The over-all system permits variation of the following parameters: hovering altitudes and temperature; blade radius, chord, tip speed, and number of blades; variation of blade profile drag coefficient; duct cross-section area/blade cross-section area; pressure drop in static duct between engine and blade root; duct friction coefficient; tip nozzle velocity coefficient; and the gas parameters: mass flow, pressure ratio, temperature, gas properties. (Author)

AD-290 328 Div. 27
(TISTA/SEB) OTS price $1.60

Rohm and Haas Co., Huntsville, Ala.
DEVELOPMENT OF A HOT GAS VALVE,
by William C. Stone. 30 Nov 62, 14p. incl. illus.
(Rept. no. S-37)
(Contract DA 01-021-ORD-11878)
Unclassified report

DESCRIPTORS: *Control valves, Valves, Rocket motor nozzles, Gases, Combustion chamber gases, Injection, Erosion, Solid rocket propellants, Aluminum, Particles, Exhaust gases, Design, Tests.

A unique hot gas valve incorporating a replaceable seat for positive and reliable sealing was designed, fabricated, and tested with both aluminized and non-aluminized propellants. Three hot firings were conducted with durations up to 28 sec. The unique sealing method worked well with non-aluminized propellant, but the experimental valve withstood the hotter exhaust from an aluminized propellant for only 14 seconds. Modifications to the present design could probably produce a significantly improved valve for use with aluminized propellants. (Author)

AD-290 333 Div. 27, 31
(TISTA/GEC) OTS price $6.60

Electric Boat Div., General Dynamics Corp., Groton, Conn.
PROPULSION MACHINERY AND PITCH CHANGING SYSTEMS FOR THE TANDEM PROPELLER.
Interim rept. no. 1 on Design Study rept., Suppl. 1 and 2,
by T. J. Gerken, A. C. McClure, and W. L. Pryor. 30 Sep 62, 56p. incl. illus. tables (Suppl. nos. 1 and 2 to Rept. no. U413-62-092, AD-283 090)
(Contract Nonr-338300; Subcontract to General Electric Co., Schenectady, N. Y. and Elliott Co., Jeannette, Pa.)
Unclassified report

DESCRIPTORS: *Underwater propulsion, *Marine propellers, Turbines, Generators, Submarine engines, Design, Control systems, Variable pitch propellers.

A study of turboelectric propulsion machinery incorporating free-flooding motors for the Tandem Propeller submarine propulsion system is continued. (Author)

AD-290 809 Div. 27
(TISTE/OHD) OTS price $2.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
HAGAN CHEMICALS AND CONTROLS, INC. THREE-ELEMENT SOLID STATE ELECTRONIC BOILER FEEDWATER REGULATOR,
by B. A. Drossopoulos. 26 Nov 62, 12p. illus.
(Proj. B-442)
Unclassified report

DESCRIPTORS: *Feedwater regulators, Semiconductors, Pressure transmitters, Flowmeters, Liquid level control, Magnetic amplifiers, Servo amplifiers, Hydraulic valves, High pressure valves, Boilers, Tests.

In an effort to eliminate the problems associated with pneumatic control components and to utilize the reliability of solid state electronic equipment, a three-element electronic boiler feedwater regulator was developed. The system was comprised of three electronic transmitters, a control unit, and an electro-hydraulic servo actuated feedwater control valve. Evaluation of the control system was conducted such that the operational characteristics of the electronic portion and of the system as a whole were individually obtained. Results of evaluation of the electronic control system components, including transmitters and magnetic amplifiers, disclosed satisfactory operation with entirely trouble-free performance over an extended period. (Author)

AD-290 829 Div. 27
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
POWER EQUIPMENT MANUFACTURE (SELECTED ARTICLES). 18 Oct 62, 16p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1023 from Energomashino-stroyeniya 10:pp. 23-26, 48, 1961)
Unclassified report

DESCRIPTORS: *Gas turbine disks, *Air cooled, *Cooling, High temperature research, Gas turbines, USSR.

Air stream cooling of disks is being adopted for the gas turbines which are being produced. Therefore a number of investigations were made of the efficiency of this type of cooling. In this method of cooling, the air moves in separate dispersed streams onto the rim of the disk from both sides, while in the case of a double-crowned disk, the air also flows onto the rim between the crowns. Such a method of cooling is selected for the structural simplicity of its implementation for a sufficiently high efficiency. The tests showed a satisfactory operation of such cooling systems. At a starting gas temperature of tg = 700 C and at a relative flow of air for cooling the rotor G = 1.5% the maximum temperature of the rotor did not exceed 560 C and that of the outside shell of the case 350 C. (Author)

AD-291 098 Div. 27
(TISTA/SEB) OTS price $4.60

Picatinny Arsenal, Dover, N. J.
MALFUNCTION INVESTIGATION OF ROCKET MOTOR: 0.7-ES-2650, M3,
by Frederic R. Minns. Oct 62, 1v. incl. illus. tables (Technical rept. no. 3021)
Unclassified report

DESCRIPTORS: *Rocket motors, *Jatos, Failure (Mechanics), Rocket igniters, Electric igniters, Handling, Analysis, Tests, Surveillance drones, Solid rocket propellants.

The cause of the failure of two rocket motors to fire simultaneously while launching the Surveillance Drone, AN/USD-1, was determined. Procedures were developed to prevent recurrences of the malfunction. (Author)

AD-291 135 Div. 27
(TISTA/SEB) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
A SCINTILLATION DETECTION SYSTEM FOR THE INSPECTION OF LARGE SOLID PROPELLANT ROCKET MOTORS,
by K. F. Sinclair and H. A. Zagorites.
31 May 62, 20p. incl. illus. 4 refs. (Rept. no. NRDL-TR-589)
Unclassified report

DESCRIPTORS: *Rocket motors, *Propellant grains, Quality control, Reliability, Scintillation counters, Phototubes, Photons, Electromagnetic radiation, X rays, Test equipment, Industrial radiography, Solid rocket propellants, Test methods.

The integrity of solid propellant rocket motors is essential to their reliability. Consequently, for the motors presently used in large rockets, complete radiographic inspection is normally required. This is a costly and time consuming procedure. Future motors planned for advanced space vehicles will, however, be much larger and satisfactory radiographic coverage with existing high-energy x-ray machines and film speeds will become impossible. Sensitive scintillation detectors and associated electronic systems in place of the film offer a possible solution to the problem. Experimental results obtained with a differential continuous scan system and a Polaris A-2 motor have demonstrated the potential performance of this type of system and validated the theoretical performance equation. Extrapolation to motors as large as 20 feet in diameter has also shown the method to be a promising means of accomplishing this difficult testing task. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-289 800 Div. 28, 23
(TISTB/MS) OTS price $5.60

Georgia U., Athens.
AN EMPIRICAL INVESTIGATION OF SOME HYPOTHESES TAKEN FROM THE LONELY CROWD.
Report on the Impact of Technological Change on the Careers of Executives and Professional Personnel in Large Scale Organizations,
by Jimmie Ray Alewine. Aug 62, 54p. incl. tables, refs.
(Contract AF 49(638)804)
Unclassified report

DESCRIPTORS: *Personality, *Group dynamics, *Attitudes, *Children, Sociology, Rearing, Growth.

Certain hypotheses which were derived from The Lonely Crowd were empirically tested. The hypotheses were divided into two groups: Group I contains five hypotheses concerning childhood socialization experiences: the inner-directed person is more likely to have been reared to be more self-reliant, more interested in thrift, more ambitious, more interested in work, and reared by stricter parents than the other-directed person. The four hypotheses of Group II concerning demographic factors were: the older people today are more likely to be inner-directed; inner-directed people were more likely to have been reared in rural and small-town areas than other-directed people; the fathers of inner-directed respondents are likely to have had less formal education than fathers of other-directed respondents; and the fathers of inner-directed respondents were more likely to have been self-employed than the fathers of other-directed respondents. (Author)

AD-290 059 Div. 28
(TISTB/LMH) OTS price $1.50

Miami U., Coral Gables, Fla.
KNOWLEDGE OF RESULTS IN A MONITORING TASK.
Final report on Psychological Research on Human Performance,
by Earl L. Wiener. Aug 62, 44p. incl. illus. tables, 41 refs.
(Proj. 7183)
(AMRL TDR 62-82) Unclassified report

DESCRIPTORS: *Pilots, *Attention, *Feedback, Aviation accidents, Automatic pilots, Navigators, Behavior, Experimental data, Effectiveness, Detection, Errors.

An experiment was performed to determine the transfer effect of knowledge of results and signal rate on performance in a Mackworth-type vigilance task. Subjects were run the first day under feedback conditions of zero, partial, and full knowledge of results, and 16, 32, and 48 signals during a 48-minute run. On the second day all subjects were run under the conditions of zero knowledge of results and 32 signals. The results showed that the two experimental variables differentiated subjects on both the initial exposure and the transfer condition. In terms

of percentage of signals detected, groups initially trained with knowledge of results and high signal rates showed superior performance on both days. The usual decrement in performance over time was noted on both days. With respect to commissive errors, large individual differences contaminated the results. The data suggest that partial knowledge of results may encourage the operator to make more commissive errors than either zero or full feedback. The findings appear to recommend training with full knowledge of results and high signal rates when an operator must be placed in a situation with no knowledge of results and low signal rates. (Author)

AD-290 070 Div. 28, 11
(TISTB/MD) OTS price $2.00

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
EXPLORATORY INVESTIGATION OF THE MAN AMPLIFIER CONCEPT.
Final rept., July 61-Apr 62 on Human Performance in Advanced Systems,
by D. C. Clark, N. J. DeLeys, and C. W. Matheis.
Aug 62, 68p, incl. illus. tables, 10 refs. (Rept. no. VO-1616-V-1)
(Contract AF 18(600)1922, Proj. 7184)
(AMRL TDR 62-89) Unclassified report

DESCRIPTORS: *Human engineering, *Handling, Joints (Physiology), Anthropometry, Hydraulic servomechanisms, Mathematical analysis, Servomechanisms, Servo motors, Power amplifiers, Man, Military transportation, Cargo.

Preliminary investigations were conducted to ascertain and define some of the major problems and uncertainties requiring additional research before feasibility of the Man Amplifier concept can be evaluated. Study areas included possible Air Force applications as a basis for selecting a maximum load-carrying capability, human factors from the standpoints of body kinematics and physical anthropology, structures and mechanical design, and servo system and power requirements. It was concluded that: (1) duplication, in the Man Amplifier, of all the human joint motion capability is impractical; (2) experimentation is necessary to determine the essential joints, motion ranges, and dynamic responses; (3) the inability to counter the overturning moments will, in many instances, limit the load-handling capability; (4) conventional valve-controlled hydraulic servos are unsuitable for the Man Amplifier; and (5) particularly difficult problems will be encountered in the general areas of mechanical design, sensors, and servomechanisms. Some specific tasks that should be undertaken to assess engineering feasibility of the concept are outlined. (Author)

AD-290 255 Div. 28
(TISTB/MS) OTS price $2.60

Indiana U., Bloomington.
AN EXPERIMENTAL STUDY OF GUILT,
by Martha E. Bernal. Aug 62, 23p. incl. tables, 6 refs. (Technical rept. no. 8)
(Contract Nonr-90815)
Unclassified report

DESCRIPTORS: *Anxiety, *Behavior, Emotions, Reaction (Psychology), Reaction time, Theory.

This research investigated the magnitude of conditioned emotional and escape responses to CS representing behaviors having some probability of being punished in the population from which the experimental subjects were drawn. Female undergraduate subjects were divided into two groups, Guilt and Neutral; the Guilt Group was given the stimuli representing socially unacceptable behavior, and the Neutral Group the stimuli representing socially acceptable behavior. Autonomic responses to the two-word phrases were first recorded, and at a later date subjects made their TRs following the reading and answering of each stimulus question. Two separate experiments were done, the second being a repitition of the first, with a few changes in procedure. The main hypotheses predicted that Guilt stimuli would elicit larger autonomic and time report (TR) responses than Neutral stimuli, i.e., Guilt stimuli would elicit guilt, defined in terms of magnitude of autonomic and TR responses. The findings for Experiment I clearly showed these differences between groups. However, although autonomic responses to Guilt stimuli were larger in Experiment II, there were no significant differences in TRs to the two types of stimuli. (Author)

AD-290 262 Div. 28
(TISTB/MS) OTS price $1.10

Miami U., Coral Gables, Fla.
MOTIVATIONAL AND INCENTIVE FACTORS IN SOCIALLY INFLUENCED BEHAVIOR.
Annual rept.,
by John W. McDavid. 1 Oct 62, 9p.
(Contract Nonr-84022, Proj. NR 177-303)
Unclassified report

DESCRIPTORS: *Behavior, Personality, Personality tests, Attitudes, Social communications.

Effort was directed toward the exploration of motivational factors underlying the occurrence of conforming behavior and their interactions with a variety of situational or conditional factors. A major conjunct goal of this researc is to clarify a distinction between two major processes in socially influenced behavior: (1) a normative or agreement-seeking process, and (2) an informational or information-seeking process. A large volume of data were collected for preliminary investigation of correlations between certain standard motivational and personality assessment devices and empirical laboratory measures of conforming behavior. One specific exploration of the relationship between particular motivational factors (achievement and affiliation motivation) and one situational factor (task difficulty or ambiguity) was completed. (Author)

AD-290 264 Div. 28
(TISTB/MS) OTS price $5.60

Applied Psychological Services, Villanova, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A MULTIDIMENSIONAL SCALING ANALYSIS OF THE JOB PERFORMANCE OF NAVAL AVIATION ELECTRONICS TECHNICIANS,
by Douglas G. Schultz and Arthur I. Siegel.
Oct 62, 48p. incl. illus. tables, 23 refs.
(Contract Nonr-227900)
Unclassified report

DESCRIPTORS: *Maintenance personnel, *Training, Job analysis, Naval personnel, Tests, Effectiveness, Measurement.

This study was designed to: (1) explore the feasibility of applying standard multidimensional scaling procedures to a job task constellation, (2) develop and investigate specific methods for applying these techniques in the work oriented situation, and (3) determine the number and the nature of the dimensions of the Naval job of striker and petty officer, third class,

aviation electronics technician. The results appear to warrant the following conclusions: (1) It is feasible and fruitful to apply multidimensional scaling techniques to Naval job performance. (2) The work performed by striker and petty officer, third class, aviation electronics technicians is perceived by supervisors in the rating as involving four basic dimensions. (3) The four basic dimensions of the aviation electronics technician's job at the striker and third class petty officer level possess characteristics such that it would appear possible to devise unidimensional scales for evaluating individuals on each dimension. (Author)

AD-290 680 Div. 28, 32
(TISTB/MD) OTS price $1.60

Hebrew U. (Israel).
THE IMPACT OF PERSONAL ATTRIBUTES. HUMAN QUALITIES AND PRIMORDIAL TIES ON ROLE BEHAVIOUR,
by H. Rieger Shlonsky. Sep 62, 12p. (Technical note no. 5)
(Contract AF 61(052)480)
Unclassified report

DESCRIPTORS: *Behavior, *Attitudes, *Sociology, Israel, Culture, Personality, Religion, Age factors.

This study is intended as a preliminary attempt to explore precisely those attributes of the individual which are in a way prior to the formal definitions of roles and are at the same time not only starting points for individuals' motivation for role taking and role performance, but may also influence the very processes of crystallization of social behavior into roles and the differentiation of roles on the basis of their respective content. We began this study by delineating the area for exploration. At first, we could only point to a number of phenomena which did not fit into accepted sociological categories and constituted a residual category, including different aspects of social behavior with a vague common denominator. We then specified three kinds of attributes for preliminary investigation: biological attributes, group membership qualities, and personal traits. These may be looked upon as certain aspects of an individual's human image. Their common denominator is that they reflect some qualities of man as givens or primordials, that is to say, as evaluations of man's possible resources, or his potential. The human image is not conceived here as an isolated psychological variable but, rather, as a pattern (or system), of attributes toward basic aspects of man and human activity which is significant in regulating the meeting point between personality and social roles and groups. (Author)

AD-290 748 Div. 28
(TISTB/MS) OTS price $7.60

Vanderbilt U., Nashville, Tenn.
STUDIES IN ABSTRACTION LEARNING. VII. THE EFFECTS OF INTERPOLATED LEARNING,
by Stanford C. Ericksen and Leland E. Thune.
Oct 62, 68p. incl. illus. tables, 23 refs.
(Technical rept. no. 9)
(Contract Nonr-214901)
Unclassified report

DESCRIPTORS: *Learning, *Transfer of training, Man, Reaction (Psychology), Perception.

The RI paradigm established the basic plan for this experiment which was directed at the differential effects of interpolated learning (IL) on perception and abstraction learning. The walking maze is a seven foot equilateral triangle with 16-in. x 24-in. mats (treadle switches) in each corner. Standing on one treadle, the subject must select and walk to one of the other two corners. His task is to learn (memorize) a given sequence of 12 successive choices. At the mediational level, the maze task is essentially a 12-item rote learning list. The Perception group learned the original maze faster than the Abstraction group, and the difference was significant for both trials and errors. This is judged to be a valid difference although previous walking maze studies have shown a negligible and non-significant difference in the OL phase. (Author)

AD-290 755 Div. 28, 32
(TISTB/LMH) OTS price $3.60

Missouri U., Columbia.
ADDITIONS TO A BIBLIOGRAPHY ON THE PRESENT STATUS OF ROLE THEORY (NO. 1).
Technical rept. no. 5, 1959-1962 on A Program for the Study of Role Theory,
by Bruce J. Biddle. Oct 62, 38p. 564 refs.
(Contract Nonr-229602)
Unclassified report

DESCRIPTORS: *Bibliography, *Sociometrics, *Sociology, Group dynamics, Education, Behavior, Job analysis, Theory, Psychology, Perception.

As in the original bibliography, items chosen for inclusion in this revision were chosen primarily because they are stated or are easily translatable into the language of role theory. Once again, texts, practitioner literature, hortative material, and closely related theoretical works from other major systems have been excluded. Approximately 150 journals published in the United States and Western Europe dealing with sociology, social psychology, education, and related fields for the years 1959-62 were reviewed. (Author)

AD-290 826 Div. 28
(TISTB/MS) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPLICATION OF THE THEORY OF COMBINED CONTROL SYSTEMS TO ADAPTIVE CYBERNETIC SYSTEMS,
BY A. G. Ivakhnenko. 23 Sep 62, 25p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-977 from Trudy I Mezhdunarodnogo Kongressa Mezhdunarodnoy Federatsii po Avtomaticheskomu Upravleniyu, Moscow, Izdatel'stvo Akademii Nauk SSSR, pp. 709-725, 1961)
Unclassified report

DESCRIPTORS: *Cybernetics, *Control systems, *Errors, Automatic, Mathematical analysis, Theory, Inhibition.

The report gives further development of invariance theory and also shows that this theory is applicable not only to ordinary systems with constant characteristics, but also to cybernetic systems. In spite of the great value of invariance theory for automatic control, many scientists and engineers are still not always sufficiently informed about it. Therefore, before going into the basic aim of the report--the possibilities of applying invariance theory to cybernetic or adaptive systems--it is necessary to give a brief summary of this theory. (Author)

AD-291 106 Div. 28, 15
(TISTB/CCH) OTS price $1.10

Princeton U., N. J.
THE STOCHASTIC MODEL OF MENTAL TESTING THEORY

AND AN APPLICATION.
Rept. on Mathematical Techniques in Psychology, by Max A. Woodbury. Sep 62, 7p. 2 refs. (Rept. no. RB-62-25)
(Contract Nonr 185815, Proj. NR 150-088 and Grant G-22889)
Unclassified report

DESCRIPTORS: *Aptitude tests, Mathematical analysis, Theory.

An axiomatization of mental test theory is presented. The presentation deals explicitly with the following concepts: true score, parallel forms, reliability, validity, and combined test score. (Author)

AD-291 145 Div. 28, 16
(TISTB/MD) OTS price $8.10

Stockholm U. (Sweden).
ETHOLOGICAL STUDIES OF LOCALIZED RADIOLESIONS IN THE CENTRAL NERVOUS SYSTEM.
Final technical rept.,
by Eric Fabricius. 31 Oct 62, 1v. incl. illus. tables.
(Contract AF 61(052)195)
Unclassified report

DESCRIPTORS: *Behavior, *Radiation injuries, Pigeons, Brain, Stimulation, Electric currents, Reproduction, Proton beams, Pathology, Learning, Sound, Animals.

Observations on some instinctive actions: In pigeons bowing and nest demonstration, with the appropriate calls, was elicited by electric stimulation in the preoptic region, the anterior parts of the diencephalic periventricular gray, as well as in the paleostriatum, neostriatum. Defensive fighting and escape were released by stimulation in the diencephalic periventricular gray and the hypothalamus, whereas pecking was elicited from the paleostriatum and ektostriatum. Observations on the behavior of pigeons with restricted lesions: Restricted radiolesions in the posterior and medial striatum did not produce significant changes in the learning ability. Observations on the dam-building behavior of the beaver: Experiment in a stream tank indicated that dam-building is released by acoustical stimuli from water running over the dam and by optical stimuli from indentations in the dam. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-290 357 Div. 29
(TISTB/CCH) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
DEVELOPMENT OF A FULL PRESSURE SUIT CONTROL SYSTEM FOR ALTITUDE CHAMBER OPERATIONS,
by Donald E. Furry, Lynn A. Alford, and Harold R. Bower. 2 Oct 62, 7p. incl. illus. (Special rept. no. 62-6)
Unclassified report

DESCRIPTORS: *Remote control systems, *Pressure suits, *Altitude chambers, Naval operations, Design.

A remote control system composed of two units which can be installed in existing altitude chambers was developed. This system allows interchangeability with existing training equipment to accommodate a full pressure suit operation with minimum alterations. This remote control system was initially designed to effect a positive control of pressure suit conditions and allow for direct monitoring of both chamber and suit during training procedures while at simulated altitude. The system was useful during various research and test procedures requiring measurement of suit pressure, oxygen, and ventilation air flow. (Author)

AD-290 813 Div. 29
(TISTB/CCH) OTS price $7.60

Army Infantry Board, Fort Benning, Ga.
USER REVIEW OF INDIVIDUAL CAMOUFLAGE.
Partial rept. 7 Nov 62,40p. incl. illus.
(Proj. 2989)
Unclassified report

DESCRIPTORS: *Camouflage clothing, Military personnel, Combat.

30. RESEARCH AND RESEARCH EQUIPMENT

AD-289 821 Div. 30, 27
(TISTM/EJH) OTS price $3.60

Ohio State U. Research Foundation, Columbus.
X-RAY IMAGE SYSTEM FOR NONDESTRUCTIVE TESTING OF SOLID PROPELLANT MISSILE CASE WALLS AND WELDMENTS.
Quarterly progress rept. no. 4, 21 Mar-20 June 62,
by Jay P. Mitchell, Merle L. Rhoten and Robert C. McMaster. June 62, 48p. incl. illus. tables.
(Contract DA 33-019-ORD-3383, Proj. 5B93-32-004)
'WAL TR 142.5/1-4) Unclassified report

DESCRIPTORS: *Rocket cases, *Radiographic analysis, *Non-destructive testing, *Camera tubes, *Image tubes, Television cameras, X-rays, X-ray photography, Welds, Welded joints, Gamma rays, Aluminum, Steel, Copper, Wire, Sensitivity, Temperature.

A television X-ray image enlargement system was developed for in-motion examination of missile case materials and weldments. This system is based upon the use of small-diameter photoconductive television camera tubes as direct sensing media for penetrating radiations such as X-rays. Nine identical X-ray-sensitive, one-inch diameter, camera tubes were received and evaluated. Results indicated that they have similar response characteristics, and that these tubes can be reproduced within reasonable signal output tolerances. Penetrameter contrast sensitivity measurements of aluminum indicate that about 1.2% sensitivity is possible through 0.720-inch thick material. Imaging tests with 1/2-inch thick steel showed the outline of a 2% (1/2-inch) penetrameter with the X-ray source operating at 250 kv. at short source-object distances. Also, a television image of holes in 3/8-inch thick lead was observed by using a Cobalt-60 isotope as a radiation source. Resolution tests with 0.00039-inch (about 10 microns) diameter copper wire indicated that this size wire be visualized on the television monitor screen. (Author)

AD-289 822 Div. 30
(TISTA/GEC) OTS price $3.60

Aerodynamic Lab., Ohio State U. Research Foundation, Columbus.
INITIAL CALIBRATIONS AND PERFORMANCE OF THE ARL TWENTY-INCH HYPERSONIC WIND TUNNEL.
Rept. for Jan 60-Apr 62 on Aerospace Simulation Techniques Research,
by G. M. Gregorek. Aug 62, 27p. incl. illus. tables, 6 refs.
(Contract AF 33(616)7451, Proj. 7065)
(ARL 62-393) Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Wind tunnels, Operation, Boundary layer, Measurement, Hypersonic nozzles, Hypersonic diffusers, Heat exchangers, Air, Liquefied gases, Pressure, Recovery, Calibration.

The results obtained and the observations made from the initial operation of the Aeronautical Research Laboratories Hypersonic Wind Tunnel are treated. Mach number calibrations of two nozzle throats (nominal Mach 12 and Mach 14), performance tests of the diffuser and heat exchanger, and operational checks of the high pressure air station and of the vacuum system have been made and the results presented. Included are measurements of the boundary layer growth, effects of air liquefaction, and characteristics of overexpansion in the axisymmetric contoured nozzle used for the test series. (Author)

AD-289 825 Div. 30, 27, 8, 14
(TISTM/EJH) OTS price $1.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS-REINFORCED PLASTIC MISSILE CASES.
Quarterly technical rept. no. 3, 29 Dec 61-28 Mar 62,
by Merle Rhoten, Jay P. Mitchell and Robert C. McMaster. 20 Apr 62, 11p. illus. table.
(Contract DA 33-019-ORD-3670, Proj. 5B93-32-004)
(Technical rept. WAL TR 142.5/2-1)
Unclassified report

DESCRIPTORS: *Image tubes, *Camera tubes, *Filament wound construction, *Rocket cases, *Radiographic analysis, Television cameras, X-ray photography, Beryllium, Selenium, Thickness, Sensitivity, Photoelectric materials, Glass textiles, Laminates, Plastics.

Tube evaluations carried out during the last quarterly report period indicated that thick target materials (in excess of 30 microns) produce less signal per quantum of radiation and, consequently, images of less contrast and definition. In an effort to determine the effect of even thinner target materials, a beryllium-window vidicon tube was fabricated with a target material thickness of 15 microns. Images produced with this tube show extremely good definition and contrast. The image lag prevented in-motion viewing. After a short period of time, spots had developed on the target and it was impossible to resolve a 60-mesh screen. (Author)

AD-289 830 Div. 30
(TISTB/LMH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
COMPUTER APPLICATIONS IN MEDICINE AND THE BIOLOGICAL SCIENCES BIBLIOGRAPHY,
by Sally L. Empey. 9 Nov 62, 38p. 6 refs.
(Rept. no. SP-1025)
Unclassified report

DESCRIPTORS: *Bibliography, *Computers, *Medicine, Biology, Data processing system, Information retrieval, Cybernetics, Medical examination, Diagnosis, Medical research.

A list is presented of published documents containing material related to computer applications in medicine and the biological sciences. Some of the areas covered are: bio-medical systems, simulation, computer-aided diagnosis, information retrieval and data analysis in bio-medicine, and computer-aided medical and biological research. The emphasis has been placed primarily on recently published material because the field, although relatively new, is changing so rapidly that the information becomes quickly outdated. An earlier bibliography covers the period from 1950 to October 1960. This document, FN-1839/000/01-13, September 1961, may be obtained by writing to Document Distribution, System Development Corporation, 2500 Colorado, Santa Monica, California. Most of the reference items included in the present bibliography are more recent than October 1960. A few older items, not found in the earlier bibliography, are, however, included. (Author)

AD-289 831 Div. 30
(TISTP/FR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
JOVIAL AND ITS DOCUMENTATION,
by Christopher J. Shaw. 30 Oct 62, 15p. refs.
(Rept. no. SP-1013)
Unclassified report

DESCRIPTORS: *Programming, Language, Digital computers, Bibliography.

JOVIAL is described as a general purpose, procedure-oriented, and largely computer-independent programming language intended primarily for professional programmers. JOVIAL was designed and implemented by SDC to produce programs for large, computer-based, military command and control systems. A short history of JOVIAL's compiler design and a selected bibliography are given. (Author)

AD-289 863 Div. 30, 12
(TISTW/RD) OTS price $3.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
METHODS FOR ESTIMATING INSTRUMENTATION SYSTEM ACCURACIES.
Nov 62, 32p. incl. illus. 11 refs. (IRIG document no. 104-62)
Unclassified report

DESCRIPTORS: *Test facilities, *Instrumentation, Errors, Least squares method, Mathematical analysis, Range, Test methods, Guided missiles.

AD-289 864 Div. 30, 12
(TISTW/RD) OTS price $6.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
PRELIMINARY PLAN FOR GLOBAL TIMING SYNCHRONIZATION.
Oct 62, 63p. incl. illus. 29 refs. (IRIG document no. 106-62)
Unclassified report

DESCRIPTORS: *Test facilities, *Time, Range, Standards, Guided missiles, Instrumentation, Synchronizers.

In response to a task assignment by the IRIG

Steering Committee, the Tele-Communications Working Group has investigated the need for precise time synchronization on a global basis. The TCWG determined that valid requirements exist for microsecond synchronization. TCWG then evaluated methods of achieving the required synchronization accuracy. Information contained in this report should be considered as preliminary. A final plan will be issued at a later date. (Author)

AD-289 867 Div. 30
(TISTP/WH) OTS price $1.60

Philco Corp., Palo Alto, Calif.
SCREENING AND RANDOM ERROR ANALYSIS OF VERLORT AND TLM-18 DATA IN STANDARD DATA PROCESSING FORMAT.
Technical documentary rept.
20 Sep 62, 15p. (Rept. no. WDL-TR1905)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Digital computers, *Data processing systems, *Tracking, *Programming, *Curve fitting, *Analysis of variance, Data.

A computer program is described which when given a set of tracking data in Data Processing Format, screens the points on the basis of smoothness and estimates the standard deviations of the random errors in the screened data. (Author)

AD-289 870 Div. 30, 22
(TISTM/EJH) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF POROSITY TEST. I. APPLICATION TO BENITE STRANDS,
by Milton Roth. Oct 62, 19p. illus. tables, 11 refs. (Technical rept. no. 3022)
Unclassified report

DESCRIPTORS: *Ignitus, *Porosity, *Nondestructive testing, Structures, Surface properties, Mechanical properties, Test methods, Powders, Nitrocellulose, Explosives.

The present method for evaluating the functioning quality of benite strands is the closed bomb test for quickness. A non-destructive, faster and simpler porosity test is described which correlates very closely with the quickness test. The results obtained by each test from twenty lots of benite (representing satisfactory and unsatisfactory quality) were compared. A highly significant correlation coefficient of 0.92 was found. The regression equation with associated confidence limits was derived. This equation, which relates quickness and porosity results, can be used to predict one value from the other. (Author)

AD-290 321 Div. 30, 9
(TISTP/JW) OTS price $9.60

Massachusetts Inst. of Tech., Cambridge.
BASIC RESEARCH AND DEVELOPMENT IN FLUID POWER CONTROL FOR THE UNITED STATES AIR FORCE.
Progress rept. no. 1, 1 Oct 61-31 Jan 62,
by J. L. Shearer, D. H. Marcus and others.
31 Oct 62, 105p. incl. illus. 17 refs. (Report no. 8998-1)
(Contract AF 33(657)7535, Proj. 8226)
(ASD TDR 62-513)
Unclassified report

DESCRIPTORS: *Fluid flow, *Control systems, *Research program administration, Hydraulic power systems, Friction, Drag, Servomechanisms, Gases, Pressure, Temperature, Pneumatic systems, Jet engines.

Continuing applied research work on problems related to the design and development of high performance hydraulic and pneumatic control equipment for advanced systems is described. Sustained emphasis on high pressure pneumatic components and systems reflects a desired ultimate objective of employing hot-gas power to operate such systems. Included in this report are descriptions of work on a reaction-jet servo system and study of friction drag on reaction-jet motors; experimental studies of a flapper valve in a breadboard pneumatic servomechanism; development of transmission line theory; fluid jet relays, and a step-by-step actuator for a pulsed pneumatic information transmission system; cold gas tests of a hot-gas rate gyro; and flow characteristics of small orifices. (Author)

AD-290 398 Div. 30
(TISTP/FR) OTS price $5.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
SOLAR AND SKY ULTRAVIOLET MEASURING AND RECORDING EQUIPMENT,
by R. M. Marchgraber and R. W. Armstrong.
July 62, 51p. incl. illus. tables, 24 refs.
(USASRDL Technical rept. no. 2290)
Unclassified report

DESCRIPTORS: *Radiometers, Ultraviolet radiation, Sun, Measurement, Instrumentation, Ultraviolet filters, Phototubes, Voltage amplifiers, Feedback amplifiers.

A description is given of the development and performance of instrumentation for the continuous measurement of solar and sky ultraviolet radiation as received on a horizontal surface from sun and sky (pyranometer) as well as in normal incidence from the sun (pyrheliometer). Sources of errors such as change in air mass (filter-weighting factor) and environment (transient response) are discussed, and areas of needed improvement are indicated. (Author)

AD-290 488 Div. 30, 25, 8
(TISTW/PCR) OTS price $3.60

Contronics, Boston, Mass.
SMALL DIGITAL PANEL METER.
Quarterly progress rept. for period ending 31 Oct 61.
31 Oct 61, 25p. illus.
(Contract NObsr-85462)
Unclassified report

DESCRIPTORS: *Display systems, *Analog-to-digital converters, Transistors, Geometry, Design, Electronic circuits, Diodes, Miniature electronic equipment, Printed circuits, Shipborne.

The initial efforts to build a digital panel meter using the Contronics field effect device as the basic analog-to-digital conversion device are described. Some preliminary experimental investigations are described and paper designs are given for two possible forms of the device. The first design is a one-stage device in which the complete analog-to-digital conversion is carried out by a single field effect device. The advantage of this device lies in its simplicity and its ruggedness. The only problem which is envisaged is that of accuracy. The size of the

field effect device is limited to about 3 inches in diameter, and with conducting paper or conducting rubber it will be difficult to attain the precision required. Thin film conducting layers are being investigated to improve the prevision of the field effect device, and, combined with photographic techniques, they give promise of the required precision, The second model is a two stage device in which one decade of the conversion would be carried out by transistor circuits, and the other two decades by a single field effect device. The precision which can be attained in this combination is such that the paper or rubber field effect devices would be entirely satisfactory. (Author)

AD-290 713 Div. 30, 14
(TISTM/BRW) OTS price $2.60

Forest Products Lab., Madison, Wis.
SURFACE FLAMMABILITY AS DETERMINED BY THE FPL 8-FOOT TUNNEL METHOD,
by C. C. Peters and H. W. Eickner. Nov 62, 22p. incl. illus. tables, 15 refs. (Rept. no. 2257)
(In cooperation with Wisconsin U., Madison)
Unclassified report

Presented at Symposium on Fire Test Methods, Fourth Pacific Area National Meeting, American Society for Testing and Materials, Oct. 1, 1962, at Los Angeles, Calif.

DESCRIPTORS: *Materials, *Combustion chambers, Flames, Combustion, Test equipment, Surfaces, Woods, Plywood, Fiberboard, Acoustic insulation, Flame propagation.

One of the more accepted methods for measuring the surface flammability of materials is to observe the flame movement when the test specimen is exposed as the upper horizontal surface of a tunnel furnace. The large tunnel furnace (ASTM Standard E-84) uses this method, but because of the large size of the furnace and specimen, its use is considered impractical in many instances, especially for research and development purposes. Therefore, a small tunnel furnace to measure flame spread was developed by the U.S. Forest Products Laboratory in cooperation with the Housing and Home Finance Agency and ASTM Committee E-5. The resulting 8-foot tunnel furnace uses a specimen 14 inches wide and 8 feet long. The specimen is positioned from the horizontal at an angle of 30 degrees across the short dimension, and 6 degrees along the long dimension, so the test can be performed under natural draft conditions. Heat to induce flaming is supplied by a radiant metal plate below the specimen and by a small ignition flame applied directly against the lower end of the specimen. Order of ranking of the surface flammability of untreated wood products by the small tunnel is generally the same as by the ASTM E-84 tunnel. (Author)

AD-290 802 Div. 30
(TISTP/FR) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROJECT 861 COMPUTER PROGRAM SYSTEM. POINTING PROGRAM NOTES,
by Donna M. Hafford. 27 Nov 62, 16p. incl. tables, 13 refs. (Rept. no. 21G-6)
(Contract AF 19(628)500)
(AFESD TDR 62-238) Unclassified report

DESCRIPTORS: *Programming, Digital computers, Punched card methods, Satellite vehicle trajectories, Tracking, Radar antennas.

The Pointing program is capable of operating in any one of several modes. Latitude of operation has been further enhanced by making parameters of certain program values. Briefly, when the program is read in, it is ready, except for orbit parameters, to produce output on the basis of an arbitrary assignment of master site, mode of operation, parameter values, etc. This configuration stored within the program may be considered the standard setup. If one chooses to depart in any way from the standard setup, he simply tells the program to alter the appropriate values before initiating computation. (Author)

AD-291 051 Div. 30
(TISTP/FR) OTS price $2.60

Quartermaster Research and Engineering Command, Natick, Mass.
A GUARDED HOT-PLATE APPARATUS FOR THE MEASUREMENT OF THERMAL CONDUCTIVITY,
by Harold J. Hodge, Suzanne S. Eichacker, and George F. Fonseca. Oct 62, 20p. incl. illus. 5 refs. (Technical rept. no. PR-6)
Unclassified report

DESCRIPTORS: *Thermal conductivity, Measurement, Instrumentation, Vacuum systems, Heating elements.

The design, construction, and operation of a guarded hot-plate apparatus for measuring thermal conductivity are described. The outstanding feature of the apparatus is its versatility. It has provision for the evacuation of the sample chamber and the control of pressure within it. The atmosphere surrounding the sample may be air or any other desired gas. Sample thickness may be adjusted or measured at any time without opening the sample chamber. Provision is made for future installation of strain gages with which to measure the force applied to the sample. Results of measurements made on a standard sample are presented, and compared with results obtained by the National Bureau of Standards on the same material. It is believed that the apparatus is capable of measurements accurate within 1 percent. (Author)

AD-291 078 Div. 30
(TISTM/REB) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
CALIBRATION AND OPERATION OF A MODIFIED FLAME FUSION APPARATUS,
by J. W. Rowen, J. A. Osmer, and H. S. Guthrie. 26 Oct 62, 19p. incl. illus. tables, 6 refs.
(Rept. no. TDR-169(3240-10)TR-1)
(Contract AF 04(695)169)
(SSD TDR 62-120) Unclassified report

DESCRIPTORS: *Blow torches, Calibration, Operation, Design, Single crystals, Growth, Laboratory furnaces.

The design, fabrication, and operating techniques of a modified flame fusion apparatus are described. The modified Verneuil apparatus has a moderate range of flow rates and temperature gradients as well as general flexibility. The results of a study of the effect of temperature gradients, flame profiles, and crystal growth rates make it possible to describe an objective reproducible procedure which would be used as a type of operator's manual for the growing of single crystals of synthetic sapphire, ruby, and other electronic materials. The control of the above mentioned conditions during initial growth is extremely important in preventing cracking and fracturing prior to annealing. (Author)

AD-291 084 Div. 30, 12
(TISTA/SEB) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MOON AND PLANETARY MEASUREMENTS RESEARCH PROGRAM. SURVEY OF ROCKET- AND SATELLITE-BORNE MASS SPECTROMETERS.
Semiannual technical note, 1 Jan-30 June 62, by C. D. Schrader. 5 Oct 62, 13p. incl. illus. table, 12 refs. (Rept. no. TDR-69(2260-30)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-195) Unclassified report

DESCRIPTORS: *Mass spectrometers, Satellite vehicles, Design, Instrumentation, Space environmental conditions, Determination, Density, Space probes, Atmosphere, Planetary atmospheres, Moon, Measurement.

Of the four major types of mass spectrometers presently used in space applications - magnetic, quadrupole, Bennett, and time-of-flight spectrometers - none is capable of performing the type of measurements necessary for an adequate understanding of the earth's atmospheric structure above altitudes of 100 km. The Space Physics Laboratory is considering a new high-sensitivity mass spectrometer, specifically designed for satellite applications, which separates masses on a time-of-flight basis but which analyzes only one particle at a time. The advantages and possible developmental problems of such an instrument are discussed, and a comparison of the four types of mass spectrometers currently available is presented. (Author)

AD-291 086 Div. 30, 10, 22
(TISTM/REB) OTS price $2.60

Rohm and Haas Co., Huntsville, Ala.
ENGINEERING RESEARCH.
Quarterly progress rept., 15 June-15 Sep 62. 14 Dec 62, 23p. incl. illus. tables, 3 refs. (Rept. no. P-62-20)
(Contract DA 01-021-ORD-11878)
Unclassified report

DESCRIPTORS: *Calorimeters, Calibration, Solid rocket propellants, Specific heat, Measurement, Design, Shielding, Explosives.

A dropping-type calorimeter based on the ASTM design for measuring the mean specific heat of thermal insulation was designed and constructed for use with propellants and explosives. Protective shields were provided to reduce hazards to personnel operating the calorimeter and to minimize equipment damage in the event of fire or explosion. The main calorimeter shield was subjected to the detonation of 45 g of Composition C-4 explosive and the capsule assembly shield was subjected to the detonation of 40 g of Composition C-4 explosive. Both shields survived the test. Experimental procedures and data reduction techniques were extensions of recommended procedure of ASTM. Aluminum oxide was used to test the accuracy of the calorimeter. The arithmetic average error was +0.28% with a standard deviation of 0.40%. (Author)

AD-291 088 Div. 30, 15
(TISTP/TL) OTS price $4.60

RAND Corp., Santa Monica, Calif.
A SURVEY OF CERTAIN ASPECTS OF THE MATHEMATICS OF CONTROL PROBLEMS,
by L. D. Berkovitz. Dec 62, 37p. 46 refs. (Memo. no. RM-3309-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Control systems, *Partial differential equations, *Programming, Vector analysis, Linear systems, Calculus of variations, Differential equations, Games theory, Analysis.

A brief survey of certain aspects of the mathematics of control problems is presented. Examples of control problems in various areas of application are given to illustrate what is meant by a 'control problem' and to motivate the mathematical formulation of the problem. The mathematical formulation is then given and a survey of existence and uniqueness theorems follows. Next comes a discussion of various results characterizing an optimal control, and the relationship of these results to each other. Computation techniques and difficulties are then discussed. The survey concludes with a discussion of differential games. (Author)

AD-291 144 Div. 30
(TISTB/LMH) OTS price $4.60

Washington U., Seattle, Wash.
MAN-COMPUTER INTERFACE STUDY,
by D. L. Johnson and A. L. Kobler. June 62, 41p. incl.
(Contract AF 49(638)1070)
Unclassified report

DESCRIPTORS: *Computers, *Information retrieval, Coding, Computer logic, Information theory, Cybernetics, Scientific research, Attitudes, Operation, Theory.

A study and analysis are presented of the existence and placement of the human-computer interface in digital computer solutions of mixed system problems. Three major areas are being dealt with specifically and will be continued during the next research period: (1) attitudes toward computers, (2) machine learning techniques, and (3) memory and meaning operation and organization for association and retrieval. These three areas are being examined in respect to their potential in moving or fixing the man-machine interface in various types of problems. The ability of computers to learn, to associate in memory and relate meaning is a major element in the interface position. An effort is being carried out to develop specific information leading to a better understanding of computer learning techniques and meaning processes in respect to their effect upon interface placement. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-290 239 Div. 31, 18
(TISTM/BRW) OTS price $11.50

George Washington U., Washington, D. C.
SHIP MATERIAL READINESS,
by J. E. Hamilton. 20 Nov 62, 140p. incl. illus. tables (Serial no. T-145)
(Contract Nonr-76103, Proj. NR 345 107, Contract Nonr-76105, Proj. NR 047 001 and Contract Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Ships, *Logistics, Naval vessels, Design, Preservation, Maintenance, Deterioration, Reliability.

An attempt is made to demonstrate that the state

of obsolescence of naval ships is possibly of greater importance as a factor in making decisions as to ship deployment or assignment than deterioration is. Support is given for this claim by many examples from World Wars I and II. Statistics are presented to show that more money has been spent on modernizing the design of ships than on their repair since World War II. Obsolescence is defined as the departure in design of a ship as it exists at any time from the best which could be on hand with full exploitation of the state of the art. Deterioration is defined as the departure of the material in a ship from the brand new state and is a measure of reliability for future utilization. Obsolescence (or current installed design) establishes the datum upon which deterioration is measured. It is averred that when a report of deterioration or state of readiness is made, both the reporter and the authority using the report must refer it to the same datum which depends on the original design of the ship plus all alterations which have been made in the ship since original construction. (Author)

AD-290 610 Div. 31
(TISTA/GEC) OTS price $6.60

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
DEEP-SEA ANCHORING,
by Henry C. Beck and John O. Ess. 16 July 62, 64p. incl. illus. tables (Technical rept. no. 98)
(Contract Nonr-266(84)
Unclassified report

Original contains color plates; all ASTIA reproduction will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Oceanographic vessels, *Ships, Anchors, Wire, Naval operations, Design, Configuration, Mathematical analysis, Drag, Ocean currents, Ocean bottom, Wind, Mooring.

Deep anchoring problems are discussed. Basic catenary equations are used to develop graphical aids to anchoring, and an engineering approach is used to determine cable size, scope, etc. A summary of experience resulting from 24 anchorings is presented and discussed. (Author)

AD-290 756 Div. 31
(TISTP/FR) OTS price $2.60

Marine Physical Lab., U. of Calif., San Diego.
FLIP. FLOATING INSTRUMENT PLATFORM,
by Earl D. Bronson and Larry R. Glosten.
1 Nov 62, 19p. incl. illus. table (Rept. no. MPL-U-49/62; SIO ref. no. 62-24)
(Contract Nonr-2216(05)
Unclassified report

DESCRIPTORS: *Buoys, *Oceanographic vessels, Manned, Ballast tanks, Pneumatic reservoirs, High pressure compressors, Generators, Diesel engines.

A general non-technical summation is given of the construction, operation and potential of the R/P FLIP. FLIP, i.e., FLoating Instrument Platform, is designed as a super-stable open-sea free-floating platform from which to conduct research in the field of physical oceanography - primarily underwater acoustics to a scale heretofore impossible due to background noise and ship movement. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-290 276 Div. 32
(TISTB/LMH) OTS price $13.50

Department of the Army, Washington, D. C.
AFRICA. ITS PROBLEMS AND PROSPECTS. A BIBLIOGRAPHIC SURVEY.
27 Sep 62, 195p. illus. refs. (DA Pamphlet no. 20-62)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Bibliography, *Africa, War potential, Geography, Economics, Political science, Population, National defense, Military research, Sociology, Anthropology.

The analysts of the Army Library endeavored to select materials (both friendly and unfriendly) in such a manner that the bibliography would reflect the strategic, political, and economic factors that are emerging in Africa along with the upsurge for independence. There are approximately 500 original titles, some of which have been duplicated and used in various sections of the bibliography when the subjects of the abstracted document were so broad as to overlap into another topic or area. For the most part the materials included are available in the holdings of the Army Library, The Adjutant General's Office, Headquarters, Department of the Army. (Author)

AD-290 313 Div. 32
(TISTB/MS) OTS price $4.60

Little, Arthur D., Inc., Cambridge, Mass.
LINEAR ASSOCIATIVE INFORMATION RETRIEVAL. Report on Studies for the Design of an English Command and Control Language System,
by Vincent E. Giuliano and Paul E. Jones. Nov 62, 40p. incl. illus. 7 refs. (Rept. no. CACL-2)
(Contract AF 19(628)256)
(ESD TR 62-294) Unclassified report

DESCRIPTORS: *Information retrieval, Language, Computers, Documentation, Data processing systems, Theory, Test equipment, Mathematical analysis, Transformations (Mathematics), Automatic.

The recognition and exploitation of term associations for the retrieval of documents is discussed. A general theory of association and associative retrieval is presented; it is based on the use of linear transformations, both for establishing associations among terms and for discriminating among documents. The design and behavior of a simple experimental device which realizes the theory is discussed. (Author)

AD-290 468 Div. 32, 23
(TISTB/DGH) OTS price $2.60

Harvard U. Graduate School of Education, Cambridge, Mass.
SOME SOCIAL DETERMINANTS OF LEVEL OF EDUCATIONAL ASPIRATION,
by Robert E. Herriott. Aug 61, 19p. incl. tables, 6 refs. (Harvard Studies in Career Development no. 16)
(Contract Nonr-1866(31)
Unclassified report

Presented at the American Sociological Association, 56th Annual Meeting on 31 Aug 1961, St. Louis, Mo.

DESCRIPTORS: *Attitudes, *Education, Group dynamics, Determination, Statistical analysis, Test methods, Students, Sociometrics.

Career development studies were made which involved two theoretical factors: (1) self-assessment, relative to others which an individual has gained through comparison with relevant reference groups, and (2) the level of expectations that he perceives significant others hold for his behavior. Seven bases of self-assessment and eleven loci of expectations were used to develop four general hypotheses. The hypotheses are: (1) the higher level of self-assessment relative to others the higher the level of educational aspiration, (2) the higher the level of expectation perceived from significant others, the higher the level of educational aspiration, (3) holding constant the level of expectation perceived from significant others, the higher the level of self-assessment relative to others the higher the level of educational aspiration, and (4) holding constant level of self-assessment relative to others, the higher the level of expectation perceived from significant others the higher the level of educational aspiration. The four hypotheses developed from the two theories were confirmed by a thirty minute questionaire which was administered to 1489 adolescents. The report aims at two specific determinants of educational aspiration and career development, emphasizing that adolescent behavior is part 'shaped' by expectations of others.

AD-290 528 Div. 32, 30
(TISTB/MD) OTS price $2.60

System Development Corp., Santa Monica, Calif.
AUTOMATIC DOCUMENT CLASSIFICATION,
by H. Borko and M. D. Bernick. 15 Nov 62, 19p. 7 refs. (Technical memo. TM-771)
Unclassified report

DESCRIPTORS: *Documentation, *Data processing systems, Computers, Automatic, Subject headings, Analysis, Effectiveness, Factor analysis, Classification.

Starting with a collection of 405 document abstracts dealing with computers, the experiment in automatic document classification proceeds to construct an empirically based mathematically derived classification system by use of a factor analysis technique. The documents are then classified into these derived categories by five subjects, and the resulting classification serves as a criterion against which the automatic classification is to be evaluated. Of the ninety documents in the Validation Group which contained two or more clue words, and which therefore could be automatically classified, 44 documents, or 48.9%, were placed into their correct categories by use of a computer formula. These results are almost identical to the results obtained by Maron in a previous experiment using the same data but with a different set of classification categories and a different computational formula. The experimental evidence supports the conclusion that automatic document classification is possible. Additional experiments are described which when executed should improve the accuracy of the automatic classification technique. (Author)

AD-290 536 Div. 32
(TISTB/DGH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME ASPECTS OF THE ''VALUE'' OF LESS-DEVELOPED COUNTRIES TO THE UNITED STATES,
by Charles Wolf, Jr. Oct 62, 19p. illus. refs. (Rept. no. P-2649)
Unclassified report

DESCRIPTORS: *Foreign policy, *Political science, Federal government, Military government, Attitudes, Behavior, Economics.

AD-290 614 Div. 32, 18
(TISTB/MS) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE USE OF SOVIET MILITARY LABOR IN THE CIVILIAN ECONOMY. A STUDY OF MILITARY SHEFSTVO,
by R. Kolkowicz. Nov 62, 42p. refs. (Memo. no. RM-3360-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Labor, *USSR, *Political science, Economics, Attitudes, Public opinion, Communists, Military personnel.

There are presumably various sources of tension between the Communist party and the professional officers in the armed forces. The dissatisfaction of the military with some aspects of shefstvo represents therefore only one dissatisfaction among many. In the past the party at least tolerated the resistance raised by the military against interference with their training and readiness activities; it did nothing to appease the military. In the past few months, military demands for more resources and less interference in their training activities have been given public prominence and the party has also made several conciliatory gestures. This turn of events may indicate that though the party at one time viewed the role of the conventional forces as rather limited, recent international political and military developments may have caused Khrushchev to yield to pressure from the military. In view of this, it is likely that the uses of military labor in civilian economic establishments may be curtailed (since they interfere with training and readiness) and that the role of the conventional forces may be upgraded. (Author)

AD-290 615 Div. 32
(TISTB/LMH) OTS price $13.50

RAND Corp., Santa Monica, Calif.
THE FIFTH RAND COMPUTER SYMPOSIUM,
ed. by F. J. Gruenberger. Nov 62, 192p. incl. illus. tables (Memo. no. RM-3324-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Symposia, *Computers, *Programming, Command systems, Control systems, Language.

This Memorandum is an expurgated transcript of the Fifth Annual RAND Computer Symposium, held at The RAND Corporation, April 1962. The idea for these symposia grew out of the observation that much of the value of computing industry conferences comes from the informal conversations which take place in hotel rooms and conference corridors. The feeling that an organized ''bull session'' might be a worthwhile endeavor led to the invitation of some 20 individuals to come to RAND for a full day of discussion on common problems in the computer field. These sessions have been held annually since 1958 on the day just prior to the Western Joint Computer Conference. The Symposium is, in effect, a meeting of individuals prominent in the industry. The

discussion during the fifth symposium centered around the topic, 'Pros and Cons of Common Languages,' with special consideration being given to use by the military of Command and Control languages. Because this topic is of special interest to the US Air Force and the computing field in general, the transcript of the 1962 Symposium is being released as a RAND Memorandum. An article based on this transcript appears in the October and November 1962 issues of Datamation magazine. (Author)

AD-291 087 Div. 32
(TISTB/DGH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE NEW EUROPE AND THE USA - SOME QUESTIONS, by Horst Mendershausen. Oct 62, 25p. (Memo. no. RM-3332-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Political science, *Europe, *Economics, Federal government, Public opinion, Commerce.

Contents:
Is Western Europe creating a new sovereignty
What is the political face of the Common Market going to be
Is Western Europe becoming less vulnerable to the Soviet Union
What does the New Europe mean to the United States

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

AGRICULTURE

TID-16328 $2.60

Interamerican Inst. of Agricultural Sciences, Turrialba (Costa Rica).
THE APPLICATION OF NUCLEAR ENERGY TO AGRICULTURE, by Carl C. Moh. Supplementary rept. on Contract AT(30-1)-2043. 1 July 62, 29p. 5 refs.

UCLA-494 $1.60

California U., Los Angeles. School of Medicine.
REACTIONS OF TUNGSTEN IN SOILS AND ITS UPTAKE BY PLANTS, by E. M. Romney and J. D. Childress. Rept. on Contract AT(04-1)-GEN-12. Nov 61, 18p. 17 refs.

ASTRONOMY

Astrophysics

NASA N62-16636 $8.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A PROGRAM OF RESEARCH FOR THE DETERMINATION OF RARE-EARTH ELEMENTAL ABUNDANCES IN METEORITES, by R. A. Schmitt and R. H. Smith. Annual rept. 15 Sep 61-14 Aug 62, on Contract NASr-75. 28 Aug 62, 83p. 70 refs. GA-3411.

NASA N62-16864 $8.60

Iowa State U., Iowa City.
A STUDY OF THE AURORA AUSTRALIS IN CONNECTION WITH AN ASSOCIATION BETWEEN VLF EHISS AND AURORAL ARCS AND BANDS OBSERVED AT SOUTH GEOGRAPHICAL POLE, 1960, by Henry M. Morozumi. Master's thesis. Rept. on Grant NsG-233-62 Aug 62, 97p. 61 refs. SUI-62-14.

NASA N62-17163 $1.10

Massachusetts Inst. of Tech., Cambridge.
THE RELATION BETWEEN COSMIC X-RAYS AND GAMMA RAYS, by George W. Clark. Rept. on Contract NASw-37. [1962] 9p., 12 refs.

NASA N62-15714 $2.60

Oklahoma State U. Research Foundation, Stillwater.
ANALYTICAL AND EXPERIMENTAL STUDY OF THE MECHANISMS OF PENETRATION AND LIGHT EMISSION FOR MICROMETEOROID IMPACT ON AN ALUMINUM-COATED PHOTOMULTIPLIER. by F. C. Todd, B. A. Sodek and others. Quarterly progress rept. no. 7, 1 Apr-30 June 62, on Contract NASr-7. [1962]

NASA N62-17925 $4.60

Rand Corp., Santa Monica, Calif.
SCIENCE OF THE SOLAR SYSTEM: 1961 LITERATURE SURVEY, PART III. BOOK NOTES: A SELECTED LIST, by Donna Wilson. Rept. on Contracts NaSr-21(04), AF 49(638)700, and NAS7-100. Nov 62, 46p. 40 refs. Memo. RM-3109/3-NASA.

BEHAVIORAL SCIENCES

Human Engineering

PB 162 418 $1.60

[6570th Aerospace Medical Research Labs., Aerospace Medical Div.] Wright-Patterson AFB, Ohio.
VISUAL RECOVERY TIMES FROM HIGH-INTENSITY FLASHES OF LIGHT, by Robert D. Metcalf and Richard E. Horn. Rept. on Visual Aids and Protection. Oct 58, 15p. 9 refs. WADC Technical rept. 58-232; AD-205 543.

DESCRIPTORS: *Sensory perception, *Vision, Eye, *Flash burns, Adaptation (Physiology), *Instrument panels, Design, Lighting equipment, Nuclear explosions

A high-intensity carbon arc was used as a light source to determine the course of visual recovery after exposure to a level of illumination comparable to that likely to be encountered during nuclear operations. The subjects in the experiment were exposed to a source subtending 3° 58' at the eye and with a luminance of up to 15 $\times 10^6$ foot-lamberts. Exposure time was constant at 0.1 second. Recovery time plotted against illumination at the eye (and source brightness) produced a straight line curve in a semilog plot. Extrapolation to the estimated burn threshold indicates a maximum recovery time of 170 seconds to discriminate a brightness contrast comparable to reading red-lighted aircraft instruments. Recovery times to other brightness levels are also indicated. (Author)

PB 162 518 $1.10

Alar Products, Inc., Cleveland, Ohio.
DESIGN AND DEVELOPMENT OF A PRESSURE AND CONTROL FOR DYNAMIC SEAT CUSHIONS, by H. L. Burns and R. E. Stockman. Rept. on Biophysics of Flight, Contract AF 33(600)31721. Dec 58, 9p. WADC Technical rept. 58-616; Ad-209 386.

DESCRIPTORS: Human engineering, *Aircraft seats, *Spacecraft seats, *Pressure regulators, Valves.

The advent of long range aircraft has created a requirement for maximum long term seating comfort. Research and development have evolved and efficient Dynamic Seat Cushion. Successful operation of a Dynamic Seat Cushion depends on close control of air pressure and inflation cycles. Engineering problems is design and development of this close control involve air pressure regulation, manual control, inflation and deflation valving, and cycle timing. The application of this control to aircraft use imposed additional requirements of light weight, small size, and reliability over wide ranges of environment and long term continuous use. (Author)

PB 162 525 $1.60

Central Inst. for the Deaf, St. Louis, Mo.
LOCALIZATION OF SOUND IN DEPTH, by Ira J. Hirsh. Final technical rept. 1 Jan-31 Dec 60, on Contract DA 49-193-md-2088. 31 Jan 61, 13p. 3 refs. AD-252 818.

DESCRIPTORS: *Auditory perception, *Sound, Auditory signals, Range finding, Measurement, Tests.

The present experiments show that auditory distance perception can be measured either in terms of a listener's ability to discriminate the distance of a variable sound source relative to that of a fixed sound source or by making absolute identifications of distance by means of a verbal response. In an anechoic environment, the intensity that would normally change according to the inverse square law as the distance of a sound source is changed can be controlled independently of all other cues to distance perception. Within the framework of the present experiments, other measurements remain to be done, namely, the absolute identification of distance when all cues are available to the listener including those produced by reflecting surfaces in the acoustic environment. Measures of distance discrimination under conditions where intensity is separated from other cues must be repeated in view of certain limitations in the present procedures. (Author)

Personnel and Training

NASA N63-10626 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF HUMAN PILOT'S ABILITY TO DETECT ANGULAR MOTION WITH APPLICATION TO CONTROL OF SPACE RENDEZVOUS, by Roy F. Brissenden. Dec 62, 17p. 7 refs. Technical note D-1498.

Order from GPO $0.25 as
NS 1.2:M31/3

National Science Foundation, Washington, D. C.
SCIENTIFIC MANPOWER FROM ABROAD. UNITED STATES SCIENTISTS AND ENGINEERS OF FOREIGN BIRTH AND TRAINING, by David Greenwood. [1962] 29p. 41 refs. NSF-62-24.

DESCRIPTORS: *Scientific personnel, *Engineering personnel, Education, Scientific organizations, Statistical data.

Order from GPO $2.00 as
NAS 1.21:5

National Aeronautics and Space Administration, Washington, D. C.
SPACE SCIENTISTS AND ENGINEERS: SELECTED BIOGRAPHICAL AND BIBLIOGRAPHICAL LISTING, 1957-1961. 1962, 335p. 1,000 refs. NASA SP-5.

DESCRIPTORS: *Scientific personnel, Personnel, *Astronautics, *Engineering personnel, *Bibliography.

Contents:
Listing by countries
Author index
Subject index

Psychology

PB 162 550 $1.60

Army Medical Research Lab., Fort Knox, Ky.
THE ACCURACY OF CONSTANT ANGULAR DISPLACEMENT OF THE ARM IN THE HORIZONTAL PLANE AS INFLUENCED BY THE DIRECTION AND LOCUS OF THE PRIMARY ADJUSTIVE MOVEMENT, by L. S. Caldwell. Rept. on Psychophysiological Studies. 27 Apr 56, 20p. 3 refs. Rept. no. 233.

DESCRIPTORS: *Sensory perception, *Proprioception, Arms, Movement, Control, Errors.

The accuracy of 10^{o} angular displacements of the arm was found to be a function of both the direction and locus of movement. Movements toward the side were most accurate in the side (50^{o} - 90^{o}) region, and movements toward the front were most accurate in the front (0^{o} - 40^{o}) region. (0^{o} represents the intersection of the horizontal and medial planes passing through the shoulder joint and 90^{o} represents the intersection of the horizontal and lateral planes.) Adjustments toward the side were more accurate than those toward the front. (Author)

PB 162 549 $1.60

Army Medical Research Lab., Fort Knox, Ky.
JUDGMENTS OF VISUAL VELOCITY AS A FUNCTION OF THE LENGTH OF OBSERVATION TIME OF MOVING OR NON-MOVING STIMULI, by Alvin G. Goldstein and L. K. Williams. Rept. on Psychophysiological Studies. 31 Jan 57, 15p. 2 refs. Rept. no. 258.

DESCRIPTORS: *Sensory perception, *Vision, Motion, Velocity, Stimulation.

A previous study demonstrated an inverse relationship between the apparent velocity of a moving visual stimulus and the duration of observation of this movement. The present experiment investigated whether this inverse relationship could be demonstrated when a non-moving visual stimulus, exposed for various durations, preceded a test stimulus moving at a particular velocity Three types of pre-test stimuli were used; contoured movement (black and white stripes), contoured non-movement and non-contoured non-movement. Twenty-six subjects viewed these stimuli for various periods of time (2, 8, 15, 22 and 30 sec). The results support the conclusion that the inverse relationship found in the earlier experiments is demonstrated following observation of moving stimuli only and not following observation of non-moving stimuli. (Author)

BIOLOGICAL SCIENCES

BNL-6284 $2.60

Brookhaven National Lab., Upton, N. Y.
METHODS FOR STUDYING CELL PROLIFERATION WITH EMPHASIS ON DNA LABELS, by Donald E. Wimber. Sep 62, 25p. 17 refs.

UCLA-486 $1.60

California U., Los Angeles. School of Medicine.
THE PRODUCTION OF IMMUNOLOGICAL TOLERANCE IN $C3H_f/Bi$ MICE TO NORMAL AND LEUKEMIC AKR MOUSE TISSUES, by Esther Fincher Hays. Rept. on Contract AT(04-1)-GEN-12. 30 Aug 61, 16p. 12 refs.

NASA N62-17067 $1.10

Naval Medical Research Inst., Bethesda, Md.
ENTHALPY CHANGES DURING THE INTERACTION OF POLADENYLIC AND POLYURIDYLIC ACIDS, by C. Kitzinger, R. F. Steiner, and T. H. Benzinger. Rept. on NASA Order R-38. [1962] 3p. 5 refs.

OTS SB-486 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PEST CONTROL (SUPERSEDES CTR-312, CTR-313, CTR-314). Oct 62, 33p. 649 refs. OTS Selective Bibliography SB-486.

DESCRIPTORS: *Pest control, Pesticides, *Insecticides, *Rodenticides, Molluscicides, *Radiobiology, Coatings, Electric currents, Birds, Parasites, Insect repellants, Sprays, Aerosol generators, Aircraft, Helicopters, Patents.

Lists 649 domestic and foreign references on pest control added to the OTS collection through October 1962. Includes information on various kinds of insecticides and pesticides; pest control by irradiation; pest control by other means, such as, coatings, insect secretions, biopreparation from air-dried insect carcasses, electric current, utilization of birds in combating noxious insects; employment of entomophages (insect eaters); biomethod (parasites used to combat insect pests); insect repellents; rodent control and rodenticides; equipment, such as, dusters, sprayers, aerosol generators, airplanes, helicopters. (Author)

TID-16657 $1.10

Okahoma State U. Research Foundation, Stillwater.
STUDIES ON GLUTATHIONE AND 2-AMINOETHANETHIOL, by George Gorin, J. Leslie and others. Final rept. 1 June 58-31 Jan 62, on Contract AT(11-1)-71. Aug 62, 6p. 3 refs.

Anatomy and Physiology

AD-274 366 $7.60

Connecticut U., Storrs.
A STUDY OF PHYSIOLOGICAL MECHANISMS UNDERLYING THE SPIRAL AFTER EFFECT, by Sheldon Lee Freud. Doctoral thesis. 1962, 72p. 28 refs.

DESCRIPTORS: *Sensory perception, *Vision, *Optical illusions, *Visual after images, Eye, Retina, Nervous system, Motion, Perception, Physiology.

It was the purpose of this study to investigate a number of problems relating to the physiological mechanisms underlying the Spiral After Effect, (SAE). The specific topics studied were: (a) Retinal vs central contributions to the SAE, (b) Hemiretinal transfer of the SAE, (c) Reliability of SAE duration, (d) Duration of the aftereffect as a function of exposure time, and (e) The effects and interactions of retinal image-size, retinal place, and hemiretinal transfer upon SAE duration.

NASA N62-16469 $2.60

Space Sciences Lab., U. of California, Berkeley.
THE PRESSURE-PULSE, by C. T. Gaffey. Rept. on Grant NsG-94-60. 11 July 62, 28p. 37 refs. Series no. 3, issue no. 10.

BNL-6229 $1.60

Brookhaven National Lab., Upton, N. Y.
PLATELET-ENDOTHELIAL INTERACTIONS AS STUDIED BY THE ELECTRON MICROSCOPE, by H. Cottier and E. P. Cronkite. 30 July 62, 16p. 40 refs.

Radiobiology

TID-16769 $1.60

Columbia U. Coll. of Physicians and Surgeons, New York, N. Y.
STUDIES ON BONE DEMINERALIZATION WITH EMPHASIS ON THE REMOVAL OF STRONTIUM. Annual progress rept. 1 Jan-31 Dec 62, on Contract AT(30-1)-2530. 1 Oct 62, 11p.

HW-SA-2638 $1.10

Hanford Atomic Products Operation, Richland, Wash.
KINETICS OF RADIATION-INDUCED HEMOLYSIS OF HUMAN RED BLOOD CELLS, by R. W. Henkens and D. R. Kalkwarf. Rept. on Contract AT(45-1)-1350. 2 July 62, 10p. 2 refs.

TID-15353 $2.60

Iowa State U. of Science and Tech., Ames.
EFFECT OF GAMMA RADIATION ON BIOLOGICAL PROPERTIES RELATED TO THE STRUCTURE OF ANIMAL VIRUSES. Technical progress rept. on Contract AT(11-1)-902. 15 Feb 62, 26p.

TID-17189 $7.60

Iowa State U. of Science and Tech., Ames.
A QUANTITATIVE STUDY OF LIFETIME SICKNESS AND MORTALITY AND PROGENY EFFECTS RESULTING FROM EXPOSURE TO PENETRATING IRRADIATION, by John W. Gowen and Janice Stadler. Summary of progress 1961-1962, on Contract AT(11-1)-107. 72p. 26 refs.

TID-17178 $4.60

Pittsburgh U., Graduate School of Public Health, Pa.
LUNG HAZARDS FROM INHALED RADIOACTIVE PARTICULATE MATTER, by Herman Cember and Joseph A. Watson. Progress rept. 15 July 58-14 Sep 59, on Contract AT(30-1)-912. 15 Sep 59, 29p. 19 refs.

TID-16349 $10.50

Radioactivity Center, Inst. of Tech., Cambridge.
RADIUM AND MESOTHORIUM POISONING AND DOSIMETRY AND INSTRUMENTATION TECHNIQUES IN APPLIED RADIOACTIVITY, by Robley D. Evans. Annual progress rept. on Contract AT(30-1)-952. May 62, 133p. 8 refs.

CHEMISTRY

TID-12072 $1.60

Argonne National Lab., Ill.
SOME LIGANDS INFLUENCING CATION COORDINATION NUMBER, by Leonard I. Katzin. [Rept. on Contract W31-109-eng-38]. Sep 60, 15p. 24 refs.

ORNL-TM-362 $1.60

Oak Ridge National Lab., Tenn.
THE ORNL ANALYTICAL CHEMISTRY DIVISION'S 150-KV COCKCROFT-WALTON GENERATOR, by J. E. Strain, W. J. Hampton, and G. W. Leddicotte. [Rept. on Contract W7405-eng-26]. 10 Sep 62, 21p. 3 refs.

OTS SB-508 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
INORGANIC CATALYSTS. [Aug 62] 14p. 206 refs. OTS Selective Bibliography SB-508

DESCRIPTORS: *Catalysts, Synthesis, Chemical reactions, Chemical equilibrium, Resins. Elastomers, Decomposition, Oxidation, Reduction, Recombination reactions, Reaction kinetics, Theory, Energy, Molecular structure, Polymers, Absorption, Gas chromatography, Electrical conductance, Acids, Semiconductors.

List 206 domestic and foreign references on inorganic compounds relating to catalysts added to the OTS collection during the period 1959 through August 1962. Includes reports on synthesis, chemical reactions, equilibrium, inorganic resins, elastomers, decomposition, oxidation, reduction, atom recombination, kinetics, theory, energy bonds, structure and activity, inorganic polymers, absorption, retarders, gas chromatography, electrical conductivity, semi-metals, acidity, and others. (Author)

OTS SB-505 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
ORGANIC CATALYSTS. PART I: ALIPHATIC COMPOUNDS AND PETROLEUM PRODUCTS. Aug 62, 18p. 266 refs. OTS Selective Bibliography SB-505.

DESCRIPTORS: *Catalysts, Organic compounds, *Aliphatic compounds, *Petroleum, Reaction kinetics, Synthesis, Sorption, Absorption, Hydrogenation, Molecular isomerism, Decomposition, Oxidation, Esterification, Labelled substances, Desulfurization.

Lists 266 domestic and foreign references pertaining to aliphatic compounds and petroleum products added to the OTS collection during the period 1959 through August 1962. Includes reports on kinetics and mechanisms of reactions involving catalysis, synthesis, sorption, adsorption, hydrogenation, dehydrogenation, isomerization, decomposition, oxidation, esterification, tracer studies, cracking, desulfurization, refining, cyclization, research, and others. (Author)

OTS SB-507 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
ORGANIC CATALYSTS. PART III: ORGANIC POLYMERS. Aug 62, 13p. 181 refs. OTS Selective Bibliography SB-507.

DESCRIPTORS: *Catalysts, Organic compounds, Polymers, Synthesis, Polyester plastics, Epoxides, Metalorganic compounds, Plastics, Fluorocarbons, Condensation reactions, Ultraviolet radiation, Elastomers, Heat treatment, Copolymerization, Polymerization, Stereochemistry, Reaction kinetics, Molecular isomerism, Resins.

Lists 181 domestic and foreign references on organic polymers relating to catalysts added to the OTS collection during the period 1959 through August 1962. Includes reports on synthesis, polyperesters, epoxies, organometallics, fluorocarbons, plastics, condensation reactions, ultraviolet curing, elastomers, high-molecular compounds, thermal treatment, graft copolymerization, stereospecific polymerization, kinetics, isomers, monomers, resins, and others. (Author)

Organic Chemistry

TID-16608 $1.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
PHYSICAL PROPERTIES AND STRUCTURAL CHARACTERISTICS OF POLYMERS RESULTING FROM "POST-EFFECT" POLYMERIZATION, by L. W. Elston and W. H. Burrows. Quarterly technical status rept. no. 1, 1 Mar-31 May 62, on Contract AT(38-1)-202. 10 June 62, 15p. 27 refs.

NASA N62-17169 $1.10

Wyandotte Chemicals Corp., Mich.
INVESTIGATION OF ACTIVATED SPECIES, by L. E. Kuentzel. Rept. on Contract NASr-24. [1962] 7p.

Physical Chemistry

NAA-SR-269 $2.60

[Atomics International, Canoga Park] Calif.
THE SEPARATION OF URANIUM FROM NaF-KF-UF_4 AND NaF-ZrF_4-UF_4 WITH BrF_3, by F. J. Keneshea, Jr. Rept. on Contract AT(11-1-GEN-8. 26 Aug 53, declassified 15 Jan 62. 22p. 6 refs.

TID-14441 $2.60

Brandeis U., Waltham, Mass.
EFFECTS OF MERCAPTANS AND DISULFIDES ON FREE RADICAL, LIGHT AND HIGH ENERGY RADIATION INDUCED REACTIONS, by Saul G. Cohen. Progress rept. on Contract AT(30-1)-2499. 8 Dec 61, 28p. 16 refs.

TID-17216 $1.60

Chicago U., Ill.
REACTIONS OF SOLVATED IONS, by Henry Taube. Final rept. on Contract AT(11-1)-378. 24 Sep 62, 9p. 31 refs.

HW-SA-2636 $1.10

Hanford Atomic Products Operation, Richland, Wash.
CATALYTIC INCREASE IN DISSOLUTION RATE OF URANIUM OXIDES BY Cl_2 IN MOLTEN SLATS, by M. C. Lambert and R. L. Braun. Rept. on Contract AT(45-1)-1350. 2 July 62, 9p.

HW-SA-2693 $4.60

Hanford Atomic Products Operation, Richland, Wash.
A DATA LOGGING ABSORPTIOMETER FOR ROUTINE URANIUM ANALYSIS, by N. P. Wilburn and W. L. Nicholson. Rept. on Contract AT(45-1)-1350. 10 Aug 62, 45p. 5 refs.

TID-16513 $1.10

Hughes Research Labs., Malibu, Calif.
STUDIES OF H_2^+ DISSOCIATION. PHASE II, by A. W. Ehler. Quarterly progress rept. no. 3, 15 May-15 Aug 62, on Contract AT(04-3)-362. 6 Sep 62, 3p.

TID-16293 $7.60

Iowa State U., Iowa City.
THE SOLID STATE CHEMISTRY OF RARE EARTH OXIDES, by Leroy Eyring. Final rept. on Contract AT(11-1)-72. 76p. 16 refs.

NASA N62-16351 $8.60

Isomet Corp., Palisades Park, N. J.
CARBON DIOXIDE REDUCTION SYSTEMS, by Dimitris Argyr, Stanley Burghardt and others. Progress rept. no. 6, 15 Sep 61-15 Mar 62, on Contract NASw-117. 15 Apr 62, 93p. Isomet rept. no. 5007-PR6-62.

NASA N63-10201 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
SAMPLING STUDIES DOWNSTREAM OF HYDROGEN-NITROUS OXIDE-DILUENT FLAMES, by Burton D. Fine. Nov 62, 22p. 11 refs. Technical note D-1528.

NASA N62-16640 $1.60

MSA Research Corp., Callery, Pa.
ELECTROLYTIC PRODUCTION OF OXYGEN AND REDUCTION OF CARBON DIOXIDE, by C. A. Palladino and R. E. Shearer. Quarterly status rept. no. 3, 1 Apr-30 June 62, on Contract NASr-70. 18 July 62, 16p. 7 refs. MSAR-62-78.

AD-279 340 $1.60

Naval Research Lab., Washington, D. C.
SURFACE VISCOSITY OF MONOMOLECULAR FILMS ON WATER AT LOW FILM PRESSURES: A LITERATURE SURVEY, by N. L. Jarvis. Interim rept. 16 Feb 62, 20p. 123 refs. NRL rept. 5743.

DESCRIPTORS: *Sea water, Surface properties, Surface tension, Waves, *Thin films, Viscosity, *Surface-active substances, Aliphatic compounds, Acids, Alcohols, Esters, Polymers, Proteins, *Reports.

Recent studies have shown that capillary waves can be effectively damped by monomolecular films at film pressures (surface tension depressions) as low as one or two dynes/cm. Such small decreases in surface tension can hardly be responsible for the formation of slicks on the surface of the ocean; the damping is more likely associated with some other property of the monomolecular film, such as its surface viscosity. This report is a review of the literature on surface viscosity; it summarizes the methods that have been used to determine surface viscosity and lists the values that have been reported for a large number of compounds. Of the surface-active compounds studied, the proteins and synthetic polymers gave the highest surface viscosities at low film pressures. Other classes of compounds, such as the fatty alcohols, fatty acids, and esters, generally gave much lower surface viscosities at film pressures of one or two dynes/cm on acid substrate. These compounds, however, have not been studied on sea water, and their surface viscosities on this substrate are not known. It is possible that they will have somewhat different surface viscosity values from those given in the literature for water substrate due to the high ratio of monovalent to divalent cations present in sea water. (Author)

EARTH SCIENCES

Order from GPO $0.35 as
I 19.16:411-D

Geological Survey, Washington, D. C.
REVIEW OF SOME ELEMENTS OF SOIL-MOISTURE THEORY. FLUID MOVEMENT IN EARTH MATERIALS, by Irwin Remson and J. R. Randolph. 1962, 41p. 70 refs. Geological Survey Professional Paper 411-D.

DESCRIPTORS: *Geophysics, *Soils, Moisture, Motion, Theory, Surface tension, Water vapor, Vapor pressure, Osmotic pressure, Diffusion, Gravity, Hydrostatic pressure, Adsorption, Thermodynamics, Distribution, Porosity.

Order from GPO $0.50 as
C 4.25/2:960

Coast and Geodetic Survey, Washington, D. C.
UNITED STATES EARTHQUAKES, 1960, by H. Carroll Talley, Jr. and William K. Cloud. 94p.

DESCRIPTORS: *Earthquakes, Maps, Alaska, Arkansas, California, Colorado, Georgia, Hawaii, Idaho, Montana, Nevada, New Mexico, North Carolina, Oregon, South Carolina, Tennessee, Washington, Puerto Rico, Panama, *Seismological stations.

PB 162 440 $2.60

Harvard U., Cambridge, Mass.
ADVANCES IN MAPPING HUMAN PHENOMENA, by Edward L. Ullman. Rept. no. 5 on Contract N5ori-07633. June 51, 22p. 5 refs.

DESCRIPTORS: *Geography, *Mapping, Economics, Transportation, Statistical data.

Climatology and Meteorology

PB 162 522 $2.60

[Army Electronics Research and Development Lab.]
Fort Monmouth, N. J.
DESIGN AND DEVELOPMENT OF AN INFRARED-ABSORPTION HYGROMETER, by Rudolf Hanel. 6 July 55, 28p. 2 refs. Technical memo. M-1677; AD-66 812.

DESCRIPTORS: *Infrared radiation, Absorption, Measurement, *Hygrometers, Design, Meteorological instruments, Humidity.

The hygrometer which was developed for use in the meteorological field is capable of measuring the absolute humidity of the atmosphere down to -60°C and ~100-mm Hg with an accuracy better than 5% RH even under the worst conditions. The design is based on a one-channel, dual-wavelength, 2-servo-loop method. The design exhibits the following advantages: flexibility in application, packagability, and high accuracy. The whole instrument can be packaged in a single housing. Electronic tubes are used only in the preamplifier and may be replaced by transistors in order to minimize the weight and size of the instrument.

NASA N62-16854 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
RADIOMETRIC MEASUREMENTS FROM SATELLITES, by R. A. Hanel. Oct 62, 13p. 24 refs. Technical note D-1463.

PB 162 560 $17.00

Naval Avionics Facility, Indianapolis, Ind.
TABLES OF ATMOSPHERIC PRECIPITABLE WATER FOR HORIZONTAL PATHS, by Glen E. Martin. Sep 57, 267p. 11 refs. Rept. no. NAFI-TP-33; AD-145 881.

DESCRIPTORS: Atmosphere, *Water vapor, *Atmospheric precipitation, Precipitation, Infrared radiation, Statistical analysis, Tables.

Tables of precipitable water for horizontal paths at 9 different altitudes are presented for 4 different geographical locations. The stations are Columbia, Mo., Cape Hatteras, N. C., Pittsburgh, Pa., and Washington, D. C. The altitudes are 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, and 6.0 km. The precipitable water is corrected for pressure broadening. The readings cover a 4-year period, July 1952 through Feb 1956. The tabulated quantity is $(\rho/\rho_0)^{1/2}H$, where H is the depth

(cm) of precipitable water in a horizontal column of air 1 km long and $(\rho / \rho_o)^{1/2}$ is a correction factor for the pressure broadening of the atmosphere when the pressure, ρ(mb), is not standard, ρ_o. Separate statistical statements concerning $(\rho / \rho_o)^{1/2}$H are made for each station, month, and altitude.

Geology

Order from GPO $1.25 as
I 19.3:1107-F

Atomic Energy Commission, Washington, D. C.
DISTRIBUTION OF ELEMENTS IN SEDIMENTARY ROCKS OF THE COLORADO PLATEAU, A PRELIMINARY REPORT. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by William L. Newman. 1962, 132p. 132 refs. Geological Survey bulletin 1107-F.

DESCRIPTORS: *Sedimentary rock, *Geology, Sandstone, Limestone, Geochemistry, *Uranium, Geological survey.

Order from GPO $1.25
I 19.3:1087-F

Atomic Energy Commission, Washington, D. C.
GEOLOGY AND ORE DEPOSITS OF THE KERN RIVER URANIUM AREA, CALIFORNIA. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by E. M. MacKevett, Jr. 1960, 65p. 35 refs. Geological Survey bulletin 1087-F.

DESCRIPTORS: *Geology, *Ores, *Uranium, *Deposits, Sedimentary rock, Rock (Geology), Geological survey, *California.

Order from GPO $1.25 as
I 19.3:1107-G

Atomic Energy Commission, Washington, D. C.
RECONNAISSANCE GEOLOGY OF HILAND-CLARKSON HILL AREA, NATRONA COUNTY WYOMING. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by Ernest I. Rich. 1962, 97p. 74 refs. Geological Survey bulletin 1107-G.

DESCRIPTORS: Geology, *Geological survey, *Uranium, *Wyoming.

Order from GPO $1.00 as
I 19.3:1147-B

Atomic Energy Commission, Washington, D. C.
URANIUM IN SOME ROCKS OF PENNSYLVANIAN AGE IN OKLAHOMA, KANSAS, AND MISSOURI. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by Harold J. Hyden and Walter Danilchik. 1962, 91p. 61 refs. Geological Survey bulletin 1147-B.

DESCRIPTORS: *Geology, *Uranium, Geochemistry, *Sedimentary rock, Shales, Radioactivity, Rock (Geology), Geological survey, Oklahoma, Kansas, Missouri.

Order from GPO $3.00 as
I 19.3:1099-B

Atomic Energy Commission, Washington, D. C.
URANIUM-BEARING COAL IN THE EASTERN PART OF THE RED DESERT AREA, WYOMING. URANIUM-BEARING COAL IN THE GREAT DIVIDE BASIN, SWEETWATER COUNTY, WYOMING, by Harold Masursky. 1962, 172p. 85 refs. Geological Survey bulletin 1099-B.

DESCRIPTORS: *Uranium, *Coal, Geology, Deserts, Geological survey, *Wyoming.

NASA N62-16862 $5.60

Boston U., Mass.
A STUDY OF TEKTITES, by Gerald S. Hawkins. Research rept. no. 14 (final) on Grant NsG-21-59. June 62, 54p. 63 refs. Tektite Project,

Order from GPO $0.40 as
I 28.27:8112

Bureau of Mines, Washington, D. C.
INDUSTRIAL SILICA DEPOSITS OF THE PACIFIC NORTHWEST, by George J. Carter, Hal J. Kelly, and E. W. Parsons. 1962, 61p. 11 refs. Information Circular 8112.

DESCRIPTORS: *Silicon compounds, *Dioxides, Minerals, *Quartz, Deposits, Geology, Sources, Industries, Materials

Data obtained from field and laboratory examinations were used by the Bureau of Mines to evaluate 82 silica deposits in the Pacific Northwest. Of the 37 deposits found to be of high quality, only 16 were large enough to be classified as industrial silica resources. Methods of simple low-cost beneficiation and rapid classification of a large number of samples were investigated in the laboratory. These tests indicated that high-intensity electromagnetic separation was equal or superior to either high-or-low-intensity electrostatic separation. In general, the electromagnetic method gave higher recoveries and produced equal or better grade concentrates. A glass button method developed for estimating iron oxide content of silica samples proved to be highly satisfactory as a means of classifying field samples and evaluating beneficiation tests. (Author)

Order from GPO $1.25 as
I 19.16:297-B

Geological Survey, Washington, D. C.
GEOLOGY OF THE HUGO PEGMATITE KEYSTONE, SOUTH DAKOTA. PEGMATITES AND OTHER PRECAMBRIAN ROCKS IN THE SOUTHERN BLACK HILLS, by J. J. Norton, L. R. Page, and D. A. Brobst. 1962, 87p. 71 refs. Geological Survey Professional Paper 297-B.
DESCRIPTORS: *Stratigraphy, *Minerals, *Petrology, Rock, Igneous rock, *Pegmatite, *Geological survey,

TEI-823 $8.60

Geological Survey, Washington, D. C.
GEOLOGY OF THE POWDER RIVER BASIN, WYOMING AND MONTANA, WITH REFERENCE TO SUBSURFACE DISPOSAL OF RADIOACTIVE WASTES, by Helen M. Beikman. Feb 62, 89p. 59 refs.

TEI-797 $6.60

Geological Survey, Washington, D. C.
INTERIM GEOLOGICAL INVESTIGATIONS IN THE U12b.09 AND U12b.07 TUNNELS, NEVADA TEST SITE, NYE COUNTY, NEVADA. GAMMA RADIOACTIVITY, by D. D. Dickey, W. L. Emerick and Carl M. Bunker. June 62, 64p. 3 refs.

ORO-571 $4.60

Institute of Marine Science, U. of Texas, Port Aransas
THE NORMAL ZINC, IRON, COBALT, MANGANESE AND SODIUM CYCLES IN A PRODUCTIVE BAY, by Patrick L. Parker, Ann Gibbs and others. Final rept. 14 May 59-14 May 62, on Contract AT(40-1)-2580. 25 May 62, 44p.

Oceanography

PB 162 521 $1.10

Arctic Inst. of North America [Washington, D. C.]
BLUE DOLPHIN LABRADOR EXPEDITIONS, WINTER PROJECT 1953, by John T. Tangerman (Dartmouth Coll.). Field rept. on Contract Nonr-1138(02). 30 Apr 54, 10p. 1 ref. AD-55 564.

DESCRIPTORS: *Oceanographic data, *Oceanographic vessels, Hydrographic surveying, Oceanology, *Labrador, Oceanography.

This project forms a continuation and an extension of the oceanographic survey operations conducted in the coastal waters of Labrador during the summers of 1949, 1950, 1951, and 1952 by the research vessel Blue Dolphin and by Blue Dolphin parties in March and April 1952 and 1953. The objective of the project was to determine the winter hydrographic structure of the waters of the northeast coast of Labrador.

PB 162 587 $2.60

Lockheed Aircraft Corp., Burbank, Calif.
PROCEEDINGS OF INTERINDUSTRIAL OCEANOGRAPHIC SYMPOSIUM (NO. 1), BURBANK, CALIFORNIA, 5 JUNE 1962, by Gordon G. Lill. 14 June 62, 30p. 19 refs.

DESCRIPTORS: *Symposia, Oceanology, *Oceanographic data, Ocean waves, Atmosphere, Boundary layer, Geophysics, Temperature.

Contents:
The interindustrial symposia
Operation cow
Interaction of the ocean and atmosphere
Temperature structure of Santa Barbara Channel
Photo technique for determining sea surface slopes

PB 162 426 $2.60

Navy Electronics Lab., San Diego, Calif.
OCEANOGRAPHIC CRUISE TO THE BERING AND CHUKCHI SEAS, SUMMER 1949. PART I: SEA FLOOR STUDIES, by E. C. Buffington, A. J. Carsola, and R. S. Dietz. 2 Oct 50, 30p. 11 refs. Rept. 204.

DESCRIPTORS: *Oceanographic data, *Bering Sea, *Chukchi Sea, *Ocean bottom, Ocean bottom topography, Sedimentation, Underwater photography, Sea water, Optical properties, Oceanology.

The floors of the Bering and Chukchi Sea shelves are flatter than any land surfaces of comparable extent on the face of the earth. Agencies producing and controlling this flatness can, as yet, only be speculated upon, and are still to be positively determined. The present bathymetry of the Bering Sea and Chukchi Sea shelves seems to be primarily related to the lack of glaciation during the ice age. The Bering Sea shelf is primarily covered with fine sand and the Chukchi Sea shelf with mud. Waters covering the Bering and Chukchi Sea shelves are unusually turbid, due largely to sediment in suspension and a high zoo-phytoplankton content. (Author)

PB 162 428-2 $4.60

Navy Electronics Lab., San Diego, Calif.
OCEANOGRAPHIC CRUISE TO THE BERING AND CHUKCHI SEAS, SUMMER 1949. PART IV: PHYSICAL OCEANOGRAPHIC STUDIES: VOL. 2. DATA REPORT. 27 May 54, 43p. Rept. 416, Vol. 2; AD-76 249.

DESCRIPTORS: *Oceanographic data, *Bering Sea, *Chukchi Sea, Sea water, Temperature, Salinity, Density, Oceanology.

PB 162 428-1 $3.60

Navy Electronics Lab., San Diego, Calif.
OCEANOGRAPHIC CRUISE TO THE BERING AND CHUKCHI SEAS, SUMMER 1949. PART IV: PHYSICAL OCEANOGRAPHIC STUDIES: VOL. I. DESCRIPTIVE REPORT, by J. F. T. Saur, J. P. Tully, and E. C. LaFond. 27 May 54, 34p. 20 refs. Rept. 416, Vol. 1; AD-55 461.

DESCRIPTORS: *Oceanographic data, *Bering Sea, *Chukchi Sea, Sea water, Temperature, Density, Salinity, Ocean currents, Oceanology.

During a two-month cruise in the summer of 1949, systematic measurements of the physical oceanography of the shallow eastern Bering and Chukchi Seas and of the Bering Strait were made. The temperature, salinity and density of the water were established, and the distribution, movements, and interaction of the water masses present in the area were investigated. A description of the results of these studies is presented. (Author)

TID-16669 $1.60

Woods Hole Oceanographic Institution, Mass.
NON-TIDAL DRIFT EXPERIMENTS OFF CAPE CANAVERAL, by Dean F. Bumpus. Rept. Mar-Aug 62, on Contract AT(30-1)-2972. 12 Sep 62, 17p.

TID-16498 $1.10

General Mills, Inc., Minneapolis, Minn.
[ATMOSPHERE MONITORING]. Letter progress rept. June-July 62, on Contract AT(11-1)-401. [10 Aug 62], 8p.

TID-16015 $1.60

General Mills, Inc., Minneapolis, Minn.
LETTER PROGRESS REPORT FOR APRIL 1962 [ON HIGH ALTITUDE SAMPLING] on Contract AT(11-1)-401 15 May 62, 15p.

TID-16988 $13.00

General Mills Electronics Group, Minneapolis, Minn.
UPPER ATMOSPHERE MONITORING PROGRAM, by R. Wood, D. Lundgren and others. 1 Aug 62, 189p. 46 refs. Rept. no. 2328.

NASA N63-10312 $2.60

Iowa State U., Iowa City.
A LARGE DIURNAL VARIATION OF THE GEOMAGNETICALLY-TRAPPED RADIATION, by B. J. O'Brien. Rept. on Grant NsG-233-62 and Contract N9onr-938(03). [1962] 25p. 12 refs. SUI-62-23-A.

ENGINEERING

Order from GPO $0.50 as I 28.27:8097

Bureau of Mines, Washington, D. C.
INDUSTRIAL ENGINEERING PRACTICE AT SELECTED METAL MINES IN WESTERN STATES, by Donald E. Redmon. 1962, 86p. 24 refs. Information Circular 8097.

DESCRIPTORS: *Mining engineering, *Management engineering, Engineering, Metals, Mines.

Industrial engineering departments perform staff duties and are most effective when sincerely supported by management. In accordance with the needs and desires of the mining companies involved, various industrial engineering functions have been adopted widely at western metal mines during the period 1950-60. Newly organized departments usually conduct method and equipment studies, work-measurement programs, and establish and maintain production standards. Supervisor-training programs and courses are effective in showing the relationship between supervisory responsibility and the purpose for which industrial engineering is practiced. (Author)

PB 181 464 $0.50

Bureau of Ships, Washington, D. C.
SHOP PRACTICE SUGGESTIONS [NO. 6]. Nov 62, 34p.

DESCRIPTORS: *Ships, Maintenance, *Machine shop practice.

Suggestions included are: Metal plate oiler; Van Zelm bridle arrester; D-2-G brass plus shells; measuring pipe land width; sea valve test; electrical cable recesses; lighting panel identification; temporary floor plates; lubricating door dogs; demagnetizing STS plate; liquid level indicating systems; lifting conical hull sections; pipe end finishing machine; pump motor bearings; installing cable hangars; JP-5 manifords; submarine stern tube stuffing box test; missile warhead hoists; adjustable cable rack holder; undercut depth gage; shaft alinement targets; piston rings for aster throttle valves; covers for temporary steam lines; removing bearing races; celastic solvent; hydraulic control stations; transistor circuit breadboard; economizer bend clamp; dispersing oil slicks; turbine valve sleeves; oil slinger rings; moving heavy pipe; inspection covers; utility jacking device; gasoline plug valves; submarine weld test plans; boiler drum calipers; taking rudder readings; installing ZEP anodes; flange pattern duplication; die for bending T-bar; removing nuts from handhole plates; gasoline deep well cargo pumps; cable plug connection; cable trunk covers; refacing boiler drum manhole seats; molding flask bars;fuse clip locking plates; boiler tube buffer; forced draft blower tools; installing stationary sootblowers; testing main feed pumps; tool for cutting insulation; connector plug nipple; DeLaval pump turbine alinement; turbine rotor lifting device; electrical outlet labels; boiler tube test sleeve; propulsion steam turbine tools; oil ring sounder; machining slip rings; hitch modification to aircraft elevator; sea chest waster sleeve; jig for welding test pipe; drains for aluminum decks; cable tree and air manifold; economizer handhole plate; chromeplating air motor parts; "Z" bar straightener; wheel outriggers for mobile cranes; tallow heater; distribution panel nameplates; electric wire protection.

PB 162 588 $6.60

Coordinated Science Lab., U. of Illinois, Urbana.
PROGRESS REPORT, by Daniel Alpert. Quarterly rept. no. 2, 1 June-31 Aug 60, on Contract DA 36-039-sc-85122. [1960] 62p. 6 refs. AD-245 317.

DESCRIPTORS: Control systems, *Digital computers, *Gyroscopes, *Inertial navigation, Navigational instruments, Instrumentation, Air traffic control systems, Hyperfine structure, Vacuum systems, Programming

The electric vacuum gyroscope, a long-term high-precision, inertial navigation instrument is described. The gyro consists of a coasting spherical metal rotor accurately supported in ultrahigh vacuum by servo controlled high voltage electric fields. The rotor is initally accelerated by magnetic induction from temporary motor coils located outside the vacuum envelope. With proper magnetic shielding, this virtually frictionless bearing yields a slowdown time-constant measured in years. Torque free data-readout is accomplished optically. Several additional attempts were made to obtain a demountable seal for the nude ion gauge, but all have failed after bakeout at 400°C. Another commercial

flange with feed-throughs is being prepared for testing. The construction of a similar flange by this laboratory's tube shop is in progress. The applications of digital techniques for information processing in real time is considered. Particular attention was given to problems arising in air surveillance and tactical control of weapons. Research on computer logics, as well as developments in circuits and equipment used in these studies is reported. (Author)

PB 162 563 $13.00

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
HANDBOOK ON THE ASSEMBLY AND TESTING OF THE M.I.T. 201G INTEGRATING GYRO UNIT, by Lester R. Grohe, Jacques A. Hogg and others. Rept. on Contract AF 33(616)2039. Dec 56, 184p. Rept. R-101; DSR Proj. 52-115; AD-121 871.

DESCRIPTORS: Handbooks, Precision equipment, Gyroscopes, *Gyro stabilizers, Design, Construction, Test methods.

The handbook is written specifically for those who are engaged in the assembly and test procedures associated with the 201G unit, but it should also prove informative to engineers, designers and others who are interested in these operations.

SCR-549 $1.10

Sandia Corp., Albuquerque, N. Mex.
MATERIALS AND PROCESSES FOR CONTACT RELIABILITY, by L. K. Jones. Aug 62, 6p.

TID-16396 $1.60

Sandia Corp., Albuquerque, N. Mex.
SUGGESTED PRACTICES FOR STANDARDS LABORATORIES. Aug 62, 20p. SCDC-2742.

TID-16993 $5.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Dec 61-Jan 62, on Contract AT(29-2)-1051. 1962, 58p.

Aeronautical Engineering

PB 162 410 $12.00

Air U., Maxwell AFB, Ala.
THE DEVELOPMENT OF RESCUE AND SURVIVAL TECHNIQUES IN THE NORTH AMERICAN ARCTIC, by Oron P. South. Aug 50, declassified 15 June 54, 163p. 142 refs. AD-53 521.

DESCRIPTORS: *Rescues, *Survival, Aviation accidents Air Force operations, *Arctic regions.

Contents:
History of rescue operations
Alaskan Wing
The North Atlantic Division
The Greenland area
The Royal Canadian Air Force Rescue Service
The Arctic, desert, tropic information center
Post war activities
Problems affecting search and rescue
The development of individual bail out kits
The development of bail out and emergency landing kits
Survival instructions: a historical survey
10th Rescue Squadron
The Strategic Air Command survival school
What constitutes survival
Bibliography.

NASA N63-10181 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A STUDY OF A PILOT'S ABILITY TO CONTROL DURING SIMULATED STABILITY AUGMENTATION SYSTEM FAILURES, by Melvin Sadoff. Nov 62, 36p. 11 refs. Technical note D-1552.

Order from GPO $0.45 as
FAA 2.2:A17/5/sum

Federal Aviation Agency, Washington, D. C.
DESIGN FOR THE NATIONAL AIRSPACE UTILIZATION SYSTEM. Summary of first edition. Sep 62, 73p.

DESCRIPTORS: *Aeronautics, Air traffic, *Air traffic control systems, Navigational aids, Communication systems, Data processing systems, Radar beacons, Radar tracking, Meteorology, Design.

On June 30, 1962, the first edition of the long-range plan for the National Airspace Utilization System was completed. Because the problems are complex and extensive, the plan itself is voluminous and the details on which it is based are highly technical. Yet it is important that the essence of this plan be understood by many people who cannot afford the time to study the details of the plan. This summary describes all essential elements of the plan.

NASA N63-10624 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYTICAL STUDY OF EFFECTS OF SOME AIRPLANE AND LANDING-GEAR FACTORS ON THE RESPONSE TO RUNWAY ROUGHNESS WITH APPLICATION TO SUPERSONIC TRANSPORTS, by Norman S. Silsby. Dec 62, 26p. 1 ref. Technical note D-1492.

NASA N63-10535 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRELIMINARY EVALUATION OF TWO JET-TRANSPORT SIMULATORS FOR THE INVESTIGATION OF LANDING-CONTACT CONDITIONS, by Harold L. Crane. Nov 62, 21p. 3 refs. Technical note D-1495.

PB 162 529 $12.00

Vertol [Div., Boeing Co.] Morton, Pa.
H-21 HELICOPTER ROTOR BLADE ELECTRICAL CYCLE DE-ICING TESTS, MOUNT WASHINGTON, N. H., NOVEMBER 1955, by E. Brogan and D. Touring. Rept. on Contract AF 33(600)24065. 10 Aug 56, 169p. 5 refs. Rept. no. 22-A-17; AD-112 799.

DESCRIPTORS: Helicopters, Helicopter rotors, *Helicopter blades, *De-icing systems, Tests, Rotor blades.

The experimental, electrical, rotor blade de-icing system, which had previously provided successful de-icing during testing under simulated hovering and artificial icing conditions in the Eglin Field Climatic Hangar, provided successful de-icing during the testing at Mount Washington under natural icing and simulated forward speed (wind) conditions. It is felt that a prototype system which will provide effective icing protection for helicopter rotor blades can be designed on the basis of the design information obtained during the Eglin and Mount Washington testing of this experimental de-icing equipment. (Author)

PB 162 528 $15.50

Vertol [Div., Boeing Co.] Morton, Pa.
H-21 HELICOPTER ROTOR BLADE HOT GAS ANTI-ICING TEST, EGLIN FIELD CLIMATIC HANGER, JANUARY 1956, by H. Wahl and E. Brogan. Rept. on Contract AF 33(616)2455. 22 June 56, 233p. 8 refs. Rept. no. 42-A-06; AD-109 454.

DESCRIPTORS: Helicopters, *Helicopter rotors, *Helicopter blades, *De-icing systems, Tests, Rotor blades

Tests were performed to determine the design requirements for a hot gas, rotor, anti-icing, ice control system for helicopters. These tests were conducted on YH-21 helicopter, USAF No. 50-1244, the rear rotor blades of which were equipped with the anti-icing system. Approximately 120 test runs were performed under artificial icing conditions, to investigate the effects of variations in ambient conditions and anti-icing parameters. Throughout an ambient temperature range of 30° F to 0° F, insufficient heat was transferred from the hot gases to the blade leading edge to provide successful anti-icing. Although considerable basic information was obtained, chordwise distribution of heat over the leading edge portion of the blade could not be determined due to limitations of the thermocouples used to measure blade surface temperatures. Difficulties encountered in operation of the spray rig and the icing measurement equipment also prevented accurate determination of icing conditions. Additional testing with improved blade surface thermocouples and more accurately determined icing conditions will be required to establish the complete design requirements for a hot gas anti-icing system for helicopter rotor blades. (Author)

PB 162 527 $8.60

Vertol [Div., Boeing Co.] Morton, Pa.
H-21 HELICOPTER ROTOR BLADE HOT GAS ANTI-ICING TESTS. MT. WASHINGTON ICING RESEARCH ANNEX, FEBRUARY-APRIL 1957, by E. T. Brogan, Jr. and D. F. Manger. Rept. on Contracts AF33(616)3871 and AF 33(616)2455. 1 Oct 57, 98p. 12 refs. Rept. no. 42-A-08; AD-202 452.

DESCRIPTORS: Helicopters, *Helicopter rotors, *Helicopter blades, *De-icing systems, Tests, Rotor blades.

Ground evaluation tests were conducted on an individual blade burner, anti-icing type ice control system for H-21 helicopter rotor blades under natural icing conditions. Successful anti-icing performance was obtained throughout the range of icing conditions and ambient temperatures encountered. Test data have been correlated with the predicted performance of the system and with data obtained during previous tests under artificial icing conditions. Design requirements have been established. Although successful anti-icing performance was obtained during the evaluation, the system would not provide protection at the more severe design icing conditions for rotor ice control systems due to the limitation on gas temperature imposed by blade structural considerations. Since the design icing conditions can be met with an electric, de-icing type ice control system, a comparison has been made between such a de-icing system and an anti-icing system for the H-21 helicopter. The design data obtained for both the de-icing and anti-icing systems is also applicable to other helicopters, in particular, to the VERTOL Model 107 helicopter which is currently being considered by the Army. (Author)

Civil Engineering

PB 162 424 $3.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES. ELECTRICAL STABILIZATION OF FINE-GRAINED SOILS, by G. R. Kozan and W. B. Fenwick. Rept. on Traffic-ability and Mobility Research. Oct 61, 34p. 53 refs. Miscellaneous paper no. 3-122, rept. 7.

DESCRIPTORS: *Soils, Stabilization, Electric currents, *Electroosmosis, Theory.

A review of literature on soil stabilization by electrical methods is presented, with particular emphasis on the techniques that might be applied by the military to improve mobility of surface vehicles over very wet and unstable fine-grained soils. The mechanics of the phenomenon of electroosmosis are described, and the quantitative expressions for electroosmotic flow based on the theories of Helmholtz-Smoluchowski and Schmid are compared. In addition to enhancing drainage of soils of relatively low permeabilities, the process of electroosmosis results in a consolidation of the soil that contributes to an improved strength and stability. For possible military application, electrokinetic stabilization appears to have many advantages over techniques of soil stabilization involving the use of additives, particularly for very wet soils. Its primary disadvantage appears to be the excessive length of time required to achieve stabilization. (Author)

AD-280 501 $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
POINT BARROW TRAILS, FY 1959; SPECIAL EQUIPMENT FOR THICKENING SEA ICE, by J. E. Dykins. 23 Apr 62, 55p. 4 refs. Technical rept. R 186.

DESCRIPTORS: *Arctic regions, *Sea water, *Ice, Thickness, Construction, *Pumps, Portable shelters, *Drills, Snow vehicles, *Sleds, Tests.

Three major pieces of equipment, used in trials to investigate techniques for increasing the thickness of sea ice, were tested and evaluated: an experimental pump wanigan, a portable ice drill, and a utility service sled.

PB 162 586-1 $12.00

Armour Research Foundation, Chicago, Ill.
METHODS OF COMPARISON AND EVALUATION OF COMMUNICATION SYSTEMS, VOLUME I, by L. Valcik and J. E. McManus. Technical rept., Phase 1, on Contract AF 30(602)2074. 31 Mar 60, 166p. 118 refs. ARF Project no. E123; RADC-TR-60-97A; AD-239 198.

DESCRIPTORS: *Radio communication systems, *Microwave relay systems, Radiowaves, Terrain, Propagation, Ionosphere, Atmosphere, Scattering, *Attenuation, Diffraction, Atmospheric refraction, *Antennas, Diversity systems, *Radio relay systems, *Noise (Radio), Communication systems

An investigation is reported leading to the development of methods for comparing and evaluating long-range point-to-point communication systems. Theory and characteristics are reviewed of various propagation modes which are presently used for long-distance point-to-point communication or which show some promise for such use in the near future. The following factors are discussed: theory, availability of mode, region of the spectrum suitable for the mode, region of the spectrum suitable for the mode, special topography requirements, range capability and transmission loss, available bandwidth, fading characteristics, and typical antenna characteristics. A total of seventeen modes are discussed. (Author)

PB 162 586-2 $13.50

Armour Research Foundation, Chicago, Ill.
METHODS OF COMPARISON AND EVALUATING OF COMMUNICATION SYSTEMS, VOLUME II, by L. Valick and J. E. McManus. Technical rept., Phase 1, on Contract AF 30(602)2074. 31 Mar 60, 200p. 204 refs. ARF Project no. E123; RADC-TR-60-97B; AD-239 199.

DESCRIPTORS: *Radio communication systems, Communication systems, Ionosphere, Reflection, Ionospheric propagation, Radio waves, Scattering, Meters, *Communication sarellites (Active), *Communication satellites (Passive), *Waveguides, Transmission lines, Aurorae, Atmosphere, Propagation

Contents:
Ionospheric reflection; ionospheric scatter; meteor-burst communication; satellite communication systems; surface wave; ELF and VLF "Waveguide; transmission lines; auroral reflection

PB 162 434 $2.60

Army [Electronics] Research and Development Lab., Fort Monmouth, N. J.
EXPERIMENTS IN SWITCHING HIGH PEAK POWERS, by J. Creedon, S. Schneider and others. [1961] 23p. 1 ref.

DESCRIPTORS: Electronic equipment, *Modulators, *Thyratrons, Hydrogen, Design, Electromagnetic pulses, Electrodes, Circuits.

Contents:
Reprinted from 1960 proceedings of the sixth symposium on hydrogen thyratrons and modulators

A low-impedance, experimental modulator has been constructed at USASRDL. This modulator is capable of generating peak powers up to and in excess of 625 megawatts. The performance of several types of switch tubes at peak power levels far in excess of their rated values has been studied using a single-shot mode of operation. This paper discusses the results of this study and observations of switch tube characteristics, such as peak power and peak current capabilities, tube drop, reservoir range, time of anode takeover, current interruptions, and life. (Author)

AD-265 455 $21.00

Army [Electronics] Research and Development Lab., Fort Monmouth, N. J.
PROCEEDINGS OF THE ANNUAL SYMPOSIUM ON FREQUENCY CONTROL [NO. 15] AT SHELBURNE HOTEL, ATLANTIC CITY, NEW JERSEY, 13 MAY, 1-2 JUNE 1961. July 61, 351p. 112 refs.

DESCRIPTORS: *Frequency, *Control, *Symposia, Crystals, Piezoelectric crystals, Quartz crystals, Quartz resonators, Stability, Temperature, Frequency, Subminiature electronic equipment, Standards, Frequency dividers, Masers, Signal-to-noise ratio, Very low frequency, Radio receivers, Functions, Synthesis, Frequency multipliers, Gases, Deuterated compounds, Ammonia, Crystal filters, Crystal ovens, Atomic clocks,

Contents:
Mathematical theory of vibrations of crystal plates
Performance of quartz resonators near the alpha-beta inversion point
Frequency-temperature behavior of thickness modes of double-rotated quartz plates
Temperature compensation of piezoelectric resonators by mechanical stress
Stability studies of quartz crystals for satellites
High precision crystal measurements 1 - 15 mc
Micro-module and ultra-miniaturized crystal units
Precision glass enclosed crystal units
Precision quartz resonators
Precision crystal frequency standards
The atomic clock as a phase-stable oscillator for deep space communication
Frequency control of NBA on an international system (II)
The atomic hydrogen maser
Frequency control by gas cell standards--fundamental problems in the light of recent experimental results
The ultimate signal to noise possibilities of a maser
Choice of a molecular transition for frequency control in the millimeter wave region
Deuterated ammonia submillimeter maser - a progress report
The optical maser
Final results of a world-wide clock synchronization experiment (project WOSAC)
Frequency control by means of a phase tracking VLF receiver
The effects of frequency multipliers on the uncertainty of a frequency measurement
APC with pulse reference
Design of low power crystal oven
A temperature-compensated frequency standard
Transfer function synthesis of quartz crystal filters

PB 162 547 $4.60

California U., Los Angeles.
EXTENSIONS IN THE SYNTHESIS OF TIME OPTIMAL OR "BANG-BANG" NONLINEAR CONTROL SYSTEMS. PART I: THE SYNTHESIS OF QUASI-STATIONARY OPTIMUM NONLINEAR CONTROL SYSTEMS, by P. Chandaket and C. T. Leondes. Rept. on Adaptive Control Systems, Contract AF 49(638)438. June 60, 45p. Dept. of Engineering rept. no. 60-45. AFOSR TN-60-960; AD-247 423.

DESCRIPTORS: *Control systems, *Servomechanisms, Servo systems, Synthesis, Circuits, Design, Non-linear differential equations, Switching circuits.

Techniques were established for the synthesis of "bang-bang" or relay servos which result in an optimum nonlinear control system for the case where the system under control is of second order. The nonlinear controller utilizes a one-variable function generator in its realization. The concept of developing a controller based on the more important roots of the controlled system is examined. Emphasis is placed on designing controllers based on the two most important roots of a controlled system; these roots being treated as those closest to the origin. A control system designed so as to be optimum with this restriction is referred to as an optimum Type II control system. The scope and utility of this method are extended, and a number of significant results are obtained. The scope and utility of all these techniques in system design are demonstrated further by a number of analytical studies of these synthesis techniques. In particular, the dynamic response capabilities of systems synthesized by these techniques are studied for (1) position inputs; (2) combination of position and velocity inputs; (3) combination of position, velocity, and acceleration inputs; and (4) sinusoidal inputs. The results obtained show that these systems follow these inputs faithfully. (Author)

PB 162 562 $9.10

Chicago U., Ill.
STUDIES OF THE SCANNING X-RAY SYSTEM AS A MEANS OF EXAMINING STRUCTURE, by Robert J. Moon. Rept. on Contract AF 18(600)566. Sep 55, 104p. 29 refs. AFOSR-TR-59-179; AD-249 432.

DESCRIPTORS: *Electron guns, Design, Tests, Operation, Electron optics, Electron beams, *X-rays, X-ray laboratories, Microscopes, Structures, Analysis, Crystal detectors, *X-ray generators, Materials, Cathode ray tubes, Memory devices, Fluorescence.

The primary research goal was the development of a scanning X-ray system which would effectively and in a practical way produce an X-ray image with much more information at a greatly reduced dosage than with conventional methods. Much of the projected goal was achieved, although continuous operation of the scanning X-ray tube at 100 ma and 125 kv was not accomplished, as intended. The currents and voltages at which the tube was operated and the conditions under which it was operated indicated, however, the feasibility of achieving this level of operation. A suitable fluorescent crystal detector was developed. The electron optics of the scanning X-ray tube proved to be excellent. A pulse sorter was developed which is capable of handling 100,000,000 pps. A prototype memory tube was also constructed and used successfully. Studies were conducted on physical and biological specimens. The research work was brought to a state that indicates the necessity for the continued development of the scanning X-ray system. (Author)

PB 162 555 $1.60

Electronic Defense Lab., Mountain View, Calif.
FIELD TEST RELIABILITY PROGRAMS FOR QUICK REACTION SYSTEM DEVELOPMENT, by Guy Black. Rept. on Contract DA 36-039-sc-75012. 19 Sep 58, 13p 10 refs. Technical memo. no. EDL-M153; AD-206 264.

DESCRIPTORS: *Electronic equipment, Tests, *Reliability (Electronic), Analysis, Electronic engineering.

As an adjunct to quick reaction electronic system development a separately funded reliability program based on evaluation of field test data should be undertaken. The objective sought is to expedite the transition from prototype to post-prototype models of the equipment, following field evaluation of the prototypes. This program would be in addition to the normal attention to reliability in engineering and fabrication of prototype equipment. The program would be run concurrently with operational field support by engineers whose function would be operation and maintenance of the equipment. However, the reliability program would be a separate program. (Author)

AD-273 808 $12.00

Elgin National Watch Co., Burbank, Calif.
FABRICATION AND ACCEPTANCE TESTING OF POLARIZED SENSITIVE MICRO-MINIATURE RELAYS FOR MISSILES, by Jack Burgess. Final rept. 6 June 58-1 Sep 61, on Contracts DA 36-039-sc-77992 and DA 36-039-sc-72395. [1961] 168p.

DESCRIPTORS: *Electric relays, *Polarized relays, *Subminiature electrical equipment, Sensitivity, Manufacturing methods, Design, Tests, Relays, Coils, Contamination, Impurities, Films, Life expectancy, Guided missiles, Aircraft, Transistors, Electronic circuits, Shock resistance, Vibration.

This report covers the fabrication and acceptance testing of sensitive polarized relays based on the final prototype designs developed under a previous contract. The units were divided into three major groups and samples of the major groups were subjected to acceptance tests. The results of these tests are tabulated and indicate that although this design presents some problem areas, a modification in certain component parts would enable this device to be produced successfully. Included is a brief history of the development of the relay and the further development necessary to enable the units to be manufactured. (Author)

PB 162 433 $8.60

Elgin National Watch Co., Ill.
RELAYS FOR TRANSISTOR CIRCUITS, by Roger A. Rieckman. Final progress rept. 1 Dec 58-30 Apr 60, on Contract DA 36-039-sc-78190. [1960] 97p. AD-254 587.

DESCRIPTORS: *Electric relays, *Transistors, Subminiature electronic equipment, Springs, Circuits, Design, Electronic circuits.

Development work resulted in the design and construction of thirteen experimental relays. The relays incorporate a watch-type mechanism to operate the contacts. The control of the mechanism is accomplished by an electromagnetic circuit operating at a power input of down to two milliwatts. The total volume of the relay is five eights of a cubic inch and the relay is capable of over 100,000 on-off operations. The assembly and testing of the relays defined areas that require further development. (Author)

PB 162 420 $1.60

Fuels Research Lab., Mass. Inst. of Tech., Cambridge.
SIMULATED HIGH ALTITUDE COMBUSTION RESEARCH, by C. F. Homsy, W. P. Jensen, and A. C. Tobey. Quarterly progress rept. no. 1, 1 June-31 Aug 55, on Contract AF 33(616)3037. 2 Sep 55, 14p. 6 refs. DIC-7361 AD-122 866.

DESCRIPTORS: Simulation, High altitude, Ramjet engines, Combustion chambers, Jet engine fuels, *Combustion, Turbulence, Diffusion, Pressure, Flame Flame propagation.

Attention has been directed toward (a) theoretical analysis of model laws for scaling combustion processes, (b) experimental measurement of turbulent diffusion-flame lengths at atmospheric pressure, (c) design of equipment for extending diffusion-flame studies to pressure levels above and below atmospheric, and (d) design of apparatus and selection of instrumentation for ramjet burner studies. (Author)

PB 162 544 $3.60

General Electric Co., Philadelphia, Pa
ION EXCHANGE REGENERATIVE FUEL CELL RESEARCH AND DEVELOPMENT PROGRAM, by L. W. Niedrach and S. Gilman. Semiannual rept. for 29 Jan-30 June 60 on Contract DA 36-039-sc-85277. [1960] 34p. ARPA Order no. 80-59; AD-242 465.

DESCRIPTORS: *Fuel cells, Ion exchange, Ion exchange resins, Water, Electrolysis, Hydrogen, Oxygen, Oxidation, Electrochemistry, Space environmental conditions, Electric power production.

The research program has as its goal the development of a 500-watt regenerative ion-exchange membrane, hydrox fuel cell battery, capable of operation in the environment of outer space. From the outset it was felt that a regenerative system might presently be engineered of separate electrolyzer and fuel cell units. Such a design would, however, entail collection and transfer of water between units, an operation which might be accomplished with considerable difficulty in free space. Therefore, the research program has concerned itself with examination of the feasibility of a combined electrolyzer-fuel cell unit. The results of experiments performed to date indicate that a combination unit of this type, employing the structure and exchange resin customary in this laboratory, may not be operated in the absence of unbound membrane electrolyte. Even when properly acidified, the cell resin is subject to continual changes in chemical composition which must ultimately affect its reliability and physical life. It is now felt that in addition to the two-unit system, a combination electrolyzer-fuel cell unit of moderate capability and rather short life might be constructed using the customary strong acid cell. However, a truly satisfactory long-term solution will be gained only through development of a new cell possessing greater intrinsic stability. (Author)

NYO-9701 $3.60

General Instrument Corp., Newark, N. J.
ECONOMIC FACTORS OF MFP THERMOELECTRIC GENERATORS, by M. Barmat. Interim rept. on Contract AT(30-1)-2605. [8 June 62] 27p. 14 refs.

PB 162 447 $4.60

Hughes Aircraft Co., Culver City, Calif.
AN ELECTRIC VOLUMETRIC SCANNING TWO-DIMENSIONAL ANTENNA ARRAY, by J. L. Spradley. Rept. on Contract AF 33(600)31582. 1 Sep 57. 42p. 9 refs. Technical memo. no. 571; AD-157 982.

DESCRIPTORS: *Electronic scanners, Design, *Radar antennas, X-band, Phase shifters, Ferrites, Antenna radiation patterns.

By proper interelement phase control, the beam of a stationary two-dimensional antenna array can be scanned throughout a volume in space. This scanningis demonstrated with an array of radiating waveguides fed by a unique arrangement which permits both independent phase control of every element and frequency scanning along one dimension of the array. Volumetric scanning is achieved by various combinations of these phase-shifting schemes. The measured beam position corresponds very favorably with theory for any given phase distribution. The adverse sidelobes appearing in the measured radiation patterns correspond to systematic errors. Methods for suppressing these systematic errors are discussed in detail, and encouraging experimental results are reported. (Author)

TID-16654 $3.60

ITT [Industrial] Labs., Fort Wayne, Ind.
IMAGE INTENSIFIER DEVELOPMENT, by H. W. Baker, F. H. Barr and E. H. Eberhardt. Final rept. on Contract AT(11-1)-1060. 12 Jan 62. 35p.

NASA N62-16479 $7.60

Minneapolis-Honeywell Regulator Co., Minn.
ADAPTIVE STATE VECTOR CONTROL. SECTION 1. AN INTRODUCTION TO SELF-EVALUATING STATE VECTOR CONTROL OF LINEAR SYSTEMS, by C. R. Stone, F. B. Smith, Jr. and others. Final rept. pt. 1 on Contract NASr-27. 13 June 62, 73p. 3 refs. MH MPG rept. 1529-TR1.

NASA N63-10202 $0.75

Minneapolis-Honeywell Regulator Co., Minn.
MEASUREMENT OF THE STATE VECTOR, by C. A. Harvey. Nov 62, 23p. 3 refs. NASA Technical note D-1590.

NASA N63-10182 $0.50

Minneapolis-Honeywell Regulator Co., Minn.
MODES OF CONTROL, by C. A. Harvey. Nov 62, 15p. 1 ref. NASA Technical note D-1589.

NASA N62-16641 $1.60

Minneapolis-Honeywell Regulator Co., Minn.
ON OPTIMAL CONTROL FOR SYSTEMS WITH NUMERATOR DYNAMICS, by C. A. Harvey, E. B. Lee, and L. Markus (U. of Minnesota). Rept. on Contract NASr-27. [1962] 13p. 4 refs.

Order from GPO $1.50 as
NAS 1.21:2

National Aeronautics and Space Administration, Washington, D. C.
PROCEEDINGS OF THE IMAGE INTENSIFIER SYMPOSIUM, OCTOBER 24-26, 1961, FORT BELVOIR, VIRGINIA. [1962] 258p. 215 refs. NASA SP-2; NASA N62-(14873-14906).

DESCRIPTORS: *Symposia, *Image intensifiers (Electronics), Electron tubes.

Introductory papers
Image intensifier tubes
Performance of image intensifier tubes
Components of image intensifier tubes
Applications of image intensifier tubes

PB 162 551 $8.60

Pennsylvania U., Philadelphia.
FINAL REPORT, by Wade L. Fite. Rept. for 15 Dec 52-31 Aug 54, on Contract AF 18(600)487. [1954] 98p. 15 refs. [Rept. no. OSR-TR-54-28] AD-47 514.

DESCRIPTORS: *Electric discharges, *Discharge tubes, *Thyratrons, Glow discharges, Interference, Noise (Radio), Ion beams, Gas discharges.

An experimental study was made of (1) of the noise in positive-ion beams in an effort to learn about LF fluctuations in electrical discharges through gases at low pressure, and (2) the usefulness of ion beams as tools with which to study discharges. Single- and double-probe techniques were applied to cold-cathode glow discharges, hot-cathode arc discharges, and RF electrodeless discharges. Studies of the fluctuations in positive ion beams from RF electrodeless discharge sources showed that ion-beam noise is very close to shot-effect noise. Some theoretical consideration of random effects are discussed.

PB 162 422 $10.10

RCA Service Co., Inc., Camden, N. J.
A RESEARCH PLAN FOR DEVELOPING METHODS OF MAINTAINABILITY MEASUREMENT AND PREDICTION. Phase I rept. on Maintainability Techniques Study, Contract AF 30(602)2057. 6 Jan 60, 126p. 6 refs. RADC TN-60-5; AD-231 090.

DESCRIPTORS: *Research program administration, *Electronic equipment, Maintenance, Air force research, Reliability.

A research plan for developing methods of maintainability measurement and prediction is described. The plan contains the following sections: (1) a statement of research objectives and technical approach; (2) a detailed discussion of maintainability concepts and factors underlying the research effort; (3) a brief description of the research plan to be followed during the course of the project; (4) a more detailed statement of methods and the techniques to be employed; (5) a review of progress to date and planned areas of research; (6) a summary of the expected results on completion of the research; and (7) a description of the project organization and personnel to be used. (Author)

TID-16554 $1.60

Sandia Corp., Albuquerque, N. Mex.
MICROWAVE PULSE POWER MEASUREMENTS, by C. A. Denney, C. L. Mavis, and C. J. Still. 20 Aug 62, 20p. 8 refs.

PB 162 561 $10.10

SFD Labs., Inc., Union, N. J.
RESEARCH ON SUPER POWER MICROWAVE AMPLIFIERS, by H. L. McDowell. Quarterly progress rept. no. 1, 1 July-1 Oct 60, on Contract DA 36-039-sc-85379. Oct 60, 122p. 10 refs. ARPA Order no. 130-60; AD-254 556.

DESCRIPTORS: *Microwave amplifiers, Microwave equipment, Amplifiers, *Electron tubes, *Space charges, Broadband, Test equipment, Theory, Mathematical analysis, Attenuation, Cold cathode tubes, Tests, *Electronic circuits, Radiofrequency power, Anodes (Electron tubes).

This investigation is concerned with experimental and theoretical research on new principles, improved concepts and advanced techniques which will lead to overcoming the present limitations of crossed-field amplifiers. Special emphasis shall be given to increase power handling capability, stability, gain, and bandwidth of crossed-field amplifiers. Experiments conducted on a low power vehicle indicated that problems with a space charge or smooth bore mode are encountered if the input RF drive is too low. These modes prevented turn-off on removal of the input RF signal and limited the usable gain of the amplifier. Scaling relations for the required power to lock out the mode were studied and a tentative design procedure was worked out for broadband amplifiers having gains of about 15 db. Design of a high power experimental vehicle was begun. The slow-wave circuit was cold tested and progress was made on matching it. A tube with a smooth anode was constructed and used to study space charge modes. (Author)

PB 162 530 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
DEVELOPMENT OF OPTIMUM RELAY STRUCTURES FOR GUIDED MISSILES, by J. H. Cullin and J. W. Bentz. Quarterly progress rept. no. 13, 1 Dec 58-28 Feb 59, on Contract DA 36-039-sc-64655. [1959] 12p. AD-218 571.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration.

The 100 sample four pole medium power relays have been built and tested. Tests on 16 of these relays divulged inconsistencies on shock, vibration and life testing. One of the four relays that was life tested completed over 100,000 operations at 15 amperes. The difficulties present at the end of the series of life tests which led up to the present configuration still exist. Correction of shock and vibration inconsistencies can take place in the form of increased clearance between the deck plate and the inside of the case; and a better control of the return and damper spring balance. (Author)

PB 162 374 $9.60

Struthers-Dunn, Inc., Pitman, N. J.
DEVELOPMENT OF OPTIMUM RELAY STRUCTURES FOR GUIDED MISSILES. Final rept. Aug 55-Aug 60, on Contract DA 36-039-sc-64655. [1960] 119p. AD-250 251

DESCRIPTORS: *Guided missiles, Relays, Electric relays, Design, Airborne, Tests, Electrical equipment, Vibration, Shock resistance.

The four pole, medium power relay, as originally specified, was developed as a result of the work performed on this contract. A great deal of effort was spent in arriving at a compromise between vibration resistance and contact life. The final results indicated derating of contact rating or of contact life-expectancy, should be considered if any degree of safety margin is to be expected. Also the shock resistance was often influenced by changes made to improve the vibration resistance and vice versa. This was resolved for a 30 'g' vibration level and a 50 'g' shock level. The decision was made to replace the sensitive relay with a two pole, medium power relay. This two pole relay, capable of switching fifteen amperes but conforming to the latest trend toward miniaturization, filled a gaping hole in the list of available relays. The development was completed and the relay successfully endured the tests. (Author)

AD-263 349 $8.10

Struthers-Dunn, Inc., Pitman, N. J.
LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin. Final rept. Sep 56-June 61, on Contract DA 36-039-sc-72816. [1961] 89p.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Miniature electrical equipment, Armatures, Failure (Mechanics), Tests, Reliability, Shock resistance, Vibration.

Relay design objective was a pulse operated device that will transfer on a pulse regardless of pulse polarity. It must hold the new contact position after removal of the pulse. Originally a four pole and a two pole were contracted for. The mode of operation of the final design was an electromagnetically driven mechanical ratchet device. The final product is a two pole double throw relay of miniature size but capable of withstanding high vibration and shock environments. The contact load of five amperes at 30v d-c and 125°C. is the established rating. The erratic operation found as life tests progressed was traced to mechanical problems. Work is being continued to eliminate this shortcoming. (Author) (See also PB 162 542)

PB 162 531 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by C. A. Stewart and H. J. Cullin. Quarterly progress rept. no. 1, 1 Sep-30 Nov 56, on Contract DA 36-039-sc-72816. [1956] 15p. AD-136 916.

DESCRIPTORS: *Electric relays, Guided missiles, Electrical equipment, Design, *Relays, Reliability.

The first approach under this contract was to investigate the development of a magnetic latch-in structure. This structure was to have an operation which was independent of coil polarity. The problems involved in the development of such a device have been examined and are set forth in this report. We have not been successful in developing a magnetically latched structure which would operate independently of polarity; instead, it would only function because of being specifically polarized. (Author)

PB 162 532 $2.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin. Quarterly progress rept. no. 2, 1 Dec 56-28 Feb 57, on Contract DA 36-039-sc-72816. [1957] 24p. AD-142 916.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration

The method which offers the greatest promise for meeting the objective is a structure combining the mechanical advantages of a 2-wire, mechanically actuated, sequence relay with the holding advantages of permanent magnets which hold independently of the actuating mechanism when in their normal positions. Preliminary test samples will be constructed which use the principle of mechanical actuation and magnetic latching. (See also PB 162 531)

PB 162 533 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin. Quarterly progress rept. no. 3, 1 Mar-31 May 57, on Contract DA 36-039-sc-72816. [1957] 20p. AD-145 992.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, Relays, Reliability, Shock resistance, Vibration.

The relay operating principle (PB 162 532) was reduced to a practical design. The mechanism chosen was a combination of an electromagnetically driven ratchet wheel coupled to a contact actuating assembly through a cam and cam followers. The contact actuator is held by permanent magnets in the position to which the cam throws it. The material selected was 0.0005 x 1/8 beryllium copper #10 alloys, preheat treated. The shape selected was a hair pin turn with an additional form to

fit the best possible layout of the terminals. Models were constructed and tested. Although the samples fell short of the technical requirements, the basic design appeared promising.

PB 162 534 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 4, 1 June-31 Aug 57, on Contract DA 36-039-sc-72816. [1957] 19p. AD-158 035.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration

Twenty-two 4-pole unit samples were tested; results indicated the need for more mechanical force output with less electrical input. An investigation of a floating tooth design revealed excessive friction forces. The most promising design is being developed, and a model is under construction. This design employs a new concept in electromagnet armatures, and is expected to be shock and vibration resistant with little or no spring force used for the vibration resistance. Most of the power is available for operating contacts. (See also PB 162 533)

PB 162 535 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 5, 1 Sep-30 Nov 57, on Contract DA 36-039-sc-72816. [1957] 19p. AD-160 534.

DESCRIPTORS: *Electric relays, Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration.

The shock and vibration resistant magnetic circuit previously described in AD-158 035 was improved and reduced to practice. Assembly sketches are given which show the armature action and a means of imparting motion to the movable contacts. A complete relay was tested. Difficulties encountered in spring life were eliminated by using a beryllium copper coiled tension spring. Load distribution of the contact actuators was such that each energizing pulse does the same amount of work while the deenergizing part of the cycle recocks the ratchet for the next current pulse to the coil. The design of the 2-pole relay progressed toward miniatu iz- ing the interlocking armature magnetic circuit being used on the 4-pole relay. The miniaturization study indicated that a device smaller than the one specified may be completely satisfactory. (See also PB 162 534)

PB 162 536 $1.10

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 6, 1 Dec 57-28 Feb 58, on Contract DA 36-039-sc-72816. [1958] 9p. AD-205 466.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Failure (Mechanics), Shock resistance, Vibration.

The assembly of twelve sample relays of the four pole design was completed. Vibration failures and erratic operation, after a limited number of operations, caused a halt in the testing and a concentrated effort to determine the reason for these failures. Repositioning the mounting flange was tried with a resulting improvement in the vibration results. A change in cam material, from filled-teflon to metal, was made to overcome the erratic operation and the results of this change are now being evaluated. The two pole design has been completed, parts have been made and the assembly of these parts into relays is now being completed in the contractors model shop. (Author) (See also PB 162 535)

PB 162 537 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 7, 1 Mar-31 May 58, on Contract DA 36-039-sc-72816. [1958] 13p. AD-205 467.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration, Failure (Mechanics).

Sample relays of the two pole design were completed. The operating principle was checked out and found to be basicly sound, but refinements are needed, and are being made, to make it comply in full with all the technical requirements. Vibration tests on contact assemblies were run to determine proper pressures for a vibration failure threshold above 30 g. Mechanical life tests were run on a complete relay to point out weak points. The four pole relay was also tested during this interim. Vibration tests and load life tests were conducted. The vibration tests were passed successfully but failures occurred on life test. Mechanical binding in the working system was also discovered and corrective measures taken. A re-design of the four pole relay is now under consideration with the possibility of a major reduction in the size and weight. (Author) (See also PB 162 536)

PB 162 538 $1.10

Struthers-Dunn, Inc., Ptiman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 8, 1 June-31 Aug 58, on Contract DA 36-039-sc-72816. [1958] 10p. AD-211 502.

DESCRIPTORS: *Electric relays, Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration, Failure(Mechanics)

The design of the four pole relay has been changed to fit within a square can one inch by one inch. The design has been completed and drawings made of this relay giving a substantial decrease in volume over the former four pole design. The two pole relay has successfully passed the vibration test and the shock test to above 80g in all directions. Many variations of springs and pressures were tried in order to attain these results. The life testing still shows major deficiencies with failures occurring below 10,000 operations. (Author) (See also PB 162 537)

PB 162 539 $1.10

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURE FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 9, 1 Sep-30 Nov 58, on Contract DA 36-039-sc-72816. [1958] 7p. AD-213 779.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Shock resistance, Vibration, Failure(Mechanics) Temperature

The fatigue failures on the movable contact arms were eliminated by changing the spring material from silver-magnesium-nickel to berylium copper, #25 alloy, heat treated after forming. The vibration resistant feature was obtained by eliminating an extra form in the moving contact spring member and replacing it with a coined tab. The contact load life failures were traced to failures of the actuating motors at elevated temperature. Corrective measures were taken to solve the high temperature failures on future samples. (See also PB 162 538)

PB 162 541 $1.10

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 10, 1 Dec 58-31 July 59, on Contract DA 36-039-sc-72816. [1959] 10p. AD-227 038.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, *Relays, Reliability, Armatures, Temperature, Shock resistance, Vibration

The solution to the problem of armature binding at the elevated temperature involved a redesign of the electromagnet. Some minor modifications, that showed advantages over existing design, were also made at this time. Changes include improved magnetic return path, improved and simplified bearing, and better coupling between the armature halves. (Author) (See also PB 162 539)

PB 162 540 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 11, 1 Aug-31 Dec 59, on Contract DA 36-039-sc-72816. [1960] 13p. AD-234 161.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, Tests, *Relays, Failure (Mechanics).

Further investigation of the armature bearings found the screw thread bearing to be impractical for this application. Changes in the coupling mechanism between the interlocking armature halves have abandoned the direct spring coupler, that had proved so troublesome on mechanical life, in favor of a gear tooth mesh. Mechanical life failures on other parts have been overcome by material changes and in some cases redesign. (Author) (See also PB 162 541)

PB 162 542 $1.60

Struthers-Dunn, Inc., Pitman, N. J.
RESEARCH AND DEVELOPMENT LEADING TO THE ESTABLISHMENT OF LATCH-IN RELAY STRUCTURES FOR GUIDED MISSILES, by H. J. Cullin and C. A. Packard. Quarterly progress rept. no. 12, 1 Jan-30 Apr 60, on Contract DA 36-039-sc-72816. [1960] 13p. AD-241 435.

DESCRIPTORS: *Electric relays, *Guided missiles, Electrical equipment, Design, Tests, *Relays, Reliability, Failure (Mechanics).

Research and development efforts have been expended on the establishment of designs for latch-in relay structures for guided missiles. Operating conditions for the relay require response to any pulse length of coil current above a specified duration, up to an including steady on current, with the polarity not specified. Environmental conditions are the extremes of temperature, vibration and shock expected in missile applications. The main design effort is concentrated on a two-pole design with double throw contacts and having two stable positions. Research revealed that the temperature attained within the relay caused deformation of the insulating material of which the contact actuating cam was fabricated. Unreliable resetting of the ratchet mechanism was another shortcoming of recent models. A slight increase in size and a change in the cam follower design are the major features of a re-designed unit now being completed. (See also PB 162 540)

AD-272 626 $6.60

Temco Electronics, Dallas, Tex.
INVESTIGATION OF SILICON CONTROLLED RECTIFIERS FOR STATIC POWER CONVERSION, by G. P. Underbrink. Rept. no. 4 (Final) 1 Apr-1 July 61, on Contract DA 36-039-sc-85381. 15 Sep 61, 63p. 15 refs. Rept. no. T.E.R. 611.1911.

DESCRIPTORS: Silicon, *Rectifiers, Power supplies, *Power transformers, Reliability, *Inverted rectifiers, *Semiconductors, Electric currents, Electrical equipment, Inverter circuits, Direct current, Mathematical analysis, Design, Tests, Reduction, Radio interference, Solid state physics, Radiofrequency filters, Electronic switches, Oscillator circuits, Electronic circuits.

An investigation was made of silicon controlled rectifiers (SCR) used in power conversion techniques for military type power systems of one kilowatt capacity. The SCR has high voltage, power and temperature capabilities

which surpass the power conversion limitations of existing power transistors. A progress review of the SCR power conversion study is presented. Recommendations are made for the improvement of SCR commutation techniques, automatic start and protection measures, and power system reliability. Problems encountered in the dc converter study were analyzed and a modified approach to dc conversion was investigated. Construction of the experimental models was accomplished. Load, temperature, and rfi qualification testing of the 1000 va inverter was also performed. An engineering report, Study of Optimum Frequency for SCR Power Converters, generated within the scope of this program, is appended. (Author) (See Also AD-262 131).

Mechanical Engineering

NAA-SR-MEMO-7598 $1.10

Atomics International, Canoga Park, Calif.
APPARENT STRAIN VS TEMPERATURE VS CYCLES FOR SODIUM STRAIN GAGES, by M. M. Lemcoe, [Rept. on Contract AT(11-1)GEN-8]. 25 July 62, 6p.

TID-16995 $1.10

Baldwin-Lima-Hamilton Corp., Eddystone, Pa.
SODIUM COMPONENTS DESIGN PROGRAM. Progress rept. for the period ending 28 Sep 62, on Contract AT(11-1)-1213. 4 Oct 62, 10p.

ORNL-TM-333 $3.60

Oak Ridge National Lab., Tenn.
AN IBM 7090 FORTRAN PROGRAM FOR ASME UNFIRED PRESSURE VESSEL DESIGN AND PRELIMINARY COST ESTIMATION, by C. E. Prince and R. P. Milford. [Rept. on Contract W7405-eng-26]. 17 Oct 62, 40p. 5 refs.

PB 162 619 $3.60

IMC Magnetics Corp., Westbury, N. Y.
DEVELOPMENT OF COOLING DEVICE IN ACCORDANCE WITH BUREAU OF SHIPS CONTRACT SPECIFICATIONS SHIP-B-2575. DATED 11 JAN, 1960. Interim development rept. 1 Oct-31 Dec 60, on Contract NObsr-81526. [1961] 22p. AD-252 196.

DESCRIPTORS: Electric motors, Blowers, *Cooling fans, Cooling, Air, Alternating current, Design, Naval equipment, Shipborne, *Air conditioning equipmen

Progress in three areas is reported: (1) a motor suitable for operation in the present 0-464 synthesizer, capable of operating at both 60 and 400 cps, giving 30% increase in air. Design and results are given; (2) the blower and scroll for the above motor, which incorporated a mixed flow wheel to give the improved performance. Design is shown and analyzed; and (3) advanced development work on a new frame which includes a deep slot rotor which will give substantial improvement over the motor discussed in (1). (Author)

Ordnance, Missiles, and Satellite Vehicles

PB 162 600 $10.10

Air Materiel Command, Wright[-Patterson AFB] Ohio.
THE GERMAN GUIDED MISSILE X-4 (PROJECT NO. NTE-63), by F. E. Patton. Summary rept. June 47, declassified, 127p. 29 refs. Rept. no. F-SU-2131-ND; ATI-5499.

DESCRIPTORS: *Guided missiles (Air-to-air), Design, Specifications, Guided missile warheads, Guided missile fuzes, Proximity fuzes, Control systems, Guided missile launchers, Germany, Guided missiles.

Summarizes available data on German Guided Missile X-4 with details of control, radio, airframe, propulsion, production, laboratory calculations and experiments. It was considered Germany's most effective air-to-air controlled missile especially against bomber formations. History of Dr. Ing. Max Kramer, chief designer, is recorded as well as other personnel connected with the X-4 project. Report covers specifications, performance data, warhead and fuze and launching devices in considerable detail. Profusely illustrated and with adequate bibliography report. (Author)

Order from GPO $0.40 as
NAS 1.12:135

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
APPLICATION OF STATISTICAL FILTER THEORY TO THE OPTIMAL ESTIMATION OF POSITION AND VELOCITY ON BOARD A CIRCUMLUNAR VEHICLE, by Gerald L. Smith, Stanley F. Schmidt, and Leonard A. McGee. 1962, 29p. 4 refs. NASA Technical rept. R-135; AD-273 088; NASA N62-16857.

DESCRIPTORS: Spaceships, *Lunar probes, *Guidance, *Space navigation, Electronic equipment, Design, Electric filters, Electronic circuits, Statistical processes, Mathematical analysis, Differential equations, Integral equations, Statistical analysis, Matrix algebra, Matrix calculus, Simulation, Digital computers, Space flight, Dynamics.

Statistical filter theory is employed to develop a method for determining the best possible estimate of the position and velocity of a space vehicle in the midcourse phase of flight. Results of a computer simulation are given to illustrate the performance attainable. An onboard system is visualized in which the source of information is an arbitrary sequence of observations of space angles, corrupted by measurement errors. The scheme is in effect a dynamical time-varying filter, implemented by a digital computer, which processes the incoming data to compute an up-to-date optimal estimate of position and velocity.

NAA-SR-7408 $10.10

Atomics International, Canoga Park, Calif.
APPLICATIONS OF SNAP REACTOR SYSTEMS TO COMMUNICATIONS SATELLITES, by R. E. Wimmer. Rept. on Contract AT(11-1)-GEN-8. 30 July 62, 125p. 25 refs.

PB 162 430 $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE EFFECTIVENESS OF VARIOUS MATERIALS IN REDUCING REFLECTION AND TRANSMISSION OF AIR SHOCK, by Irene Cooney Filippone. Oct 51, 21p. 2 refs. Memo. rept. no. 571.

DESCRIPTORS: *Air blast, *Shock waves, Reflection, Transmission, Reduction, *Vibration isolators, Materials, *Foam rubber, *Glass textiles, Effectiveness.

Of seven materials tested to determine their ability to reduce shock reflection and transmission, Koylon foam rubber (RMA5) and Fiberglas building insulation appeared to be the most efficient. Both materials reduced appreciably the reflected peak pressures and impulses and the transmitted peak pressures. However, no change was noted in the transmitted impulse. (Author)

NASA N62-16826 $4.60

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
SPACE MAGNETOMETER DEVELOPMENT, by S. C. Ling. Quarterly status rept. 1 Mar-1 June 62, on Contract NASr-46. 1 June 62, 41p. 10 refs. CRSR-124.

NASA N62-11536 $4.60

Electro-Optical Systems, Inc., Pasadena, Calif.
DESIGN STUDY OF A SATELLITE PHOTOMETER. Final rept. on Contract NAS5-1170. 15 June 61, 37p. 3 refs. EOS rept. 1830-Final.

NASA N63-10176 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
APPLICATION OF THE MODULARIZATION CONCEPT TO SATELLITE TAPE RECORDERS, by P. T. Cole, H. J. Peake, and C. F. Rice. Nov 62, 15p. Technical note D-1451.

NASA N63-10204 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SCANNING MECHANISM FOR A SATELLITE BORNE X-RAY SPECTROMETER, by Gerald L. Hempfling. Nov 62, 17p. Technical note D-1097.

NASA N63-10177 $1.25

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
TRACKING SYSTEMS, THEIR MATHEMATICAL MODELS AND THEIR ERRORS. PART I. THEORY, by F. O. Vonbun and W. D. Kahn. Oct 62, 47p. 7 refs. Technical note D-1471.

NASA N62-16993 $2.60

Hughes Research Labs., Malibu, Calif.
ANTENNA DIRECTIONS TO CIRCULAR EQUATORIAL ORBITS, by S. G. Lutz. Rept. no. 1 on Contract Nasw-495. Aug 62, 22p. 2 refs.

NASA N62-16402 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A 35-KWE SNAP-8 SATELLITE TESTCRAFT, by J. R. Womack. Rept. on Contract NAS7-100. 7 May 62, 11p. 3 refs. Technical memo. no. 33-84.

NASA N62-17158 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A DESIGN SOLUTION TO THE SPACECRAFT LOOK-ANGLE PROBLEM, by J. N. Wilson and G. G. Coyle. Rept. on Contract NAS7-100. 6 Aug 62, 29p. Technical rept. no. 32-311.

NASA N62-16465 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-8, VOLUME I. Rept. on 15 Jan-1 Mar 61, on Contract NASw-6. 1 Apr 61, 42p. 2 refs.

NASA N62-16466 $8.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-11, VOLUME I. Rept. for 1 July-1 Sep 61 on Contract NASw-6. 1 Oct 61, 88p. 12 refs.

NASA N63-10329 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE INFLUENCE OF PRECESSION OF EARTH RENDEZVOUS ORBITS ON LUNAR MISSION REQUIREMENTS, by William R. Wells. Nov 62, 29p. 4 refs. Technical note D-1512.

NASA N63-10328 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LATERAL RANGE CONTROL BY BANKING DURING INITIAL PHASES OF SUPERCIRCULAR REENTRIES, by Donald L. Baradell. Master's thesis. Nov 62, 28p. 4 refs. Technical note D-1511.

NASA N63-10650 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
NOISE MEASUREMENTS DURING CAPTIVE AND LAUNCH FIRINGS OF A LARGE ROCKET-POWERED VEHICLE, by William H. Mayes and Philip M. Edge, Jr. Nov 62, 34p. 9 refs. Technical note D-1502.

NASA N63-10178 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATIC STABILITY INVESTIGATION OF PROPOSED PROJECT FIRE SPACE-VEHICLE AND REENTRY-PACKAGE CONFIGURATIONS AT MACH NUMBERS FROM 1.47 TO 4.63, by Dennis E. Fuller and C. Donald Babb. Nov 62, 22p. 1 ref. Technical note D-1497.

Order from GPO $0.40 as NAS 1.12:126

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYSIS OF CLOSE LUNAR TRANSLATION TECHNIQUES, by Joseph N. Sivo, Carl E. Campbell, and Vladimir Hamza. 1962, 28p. NASA Technical rept. R-126; AD-269 985; NASA N62-17170.

DESCRIPTORS: *Lunar probes, Moon, Landing, Maneuverability, Fuel consumption, Theory, Mathematical analysis, Equations, Tables.

An analysis of translational maneuvers near the lunar surface is presented. The relative merits of each type of maneuver are discussed on the basis of theoretical fuel consumption and time required for the maneuver. Equations and charts embodying these results are compiled herein to facilitate estimation of the fuel and time requirements for various translational maneuvers. (Author)

NASA N62-16639 $6.60

Minneapolis-Honeywell Regulator Co., Minn.
APPLICATIONS OF OPTIMIZATION THEORY AND PRACTICE, by F. B. Smith, Jr. and D. K. Scharmack. Rept. on Contract NASr-27. [1962] 63p. 17 refs.

NASA N63-10536 $0.75

National Aeronautics and Space Administration, Washington, D. C.
A RELIABILITY MODEL AND ANALYSIS FOR PROJECT MERCURY - 3-ORBIT MANNED AND UNMANNED MISSION, by William Wolman and Fred Okano. Dec 62, 29p. 2 refs. Technical note D-1558.

PB 162 635 $5.60

Office of the Chief of Ordnance, Dept. of the Army, Washington, D. C.
GUIDE TO TECHNICAL EVALUATION OF RESEARCH AND DEVELOPMENT PROPOSALS. Dec 61, 53p. Ordnance Corps Pamphlet ORDP 20-2.

DESCRIPTORS: *Instruction manuals, *Ordnance, *Research program administration, Military research.

The evaluation procedures discussed in this pamphlet are recommended for use by all agencies of the Ordnance Corps in evaluation of competitively negotiated R&D proposals whenever the award of a contract will be based on technical merit and factors other than lowest probable cost or lowest fixed price. While the guide is primarily directed toward the evaluation of R&D proposals, it is equally applicable to production engineering or other proposals where considerations other than lowest price will be predominant in the selection of the contractor.

NASA N62-16814 $3.60

Rand Corp., Santa Monica, Calif.
STABILITY OF A CLOUD OF ORBITING DIPOLES, by R. H. Frick. Rept. on Contract NASr-21(02). Aug 62, 37p. 1 ref. Memo. RM-3296-NASA.

Sanitation and Safety Engineering

HW-SA-2723 $2.60

Hanford [Atomic Products Operation] Richland, Wash.
TRACER TECHNIQUES AND FIELD PROCEDURES USED IN THE CAPE CANAVERAL AND VANDENBERG AIR FORCE BASE DIFFUSION EXPERIMENTS, by J. J. Fuquay, C. L. Simpson, and C. E. Elderkin. [Rept. on Contract AT(45-1)1350]. 11 Sep 62, 23p. 10 refs.

TID-16998 $6.60

Unidynamics, St. Louis, Mo.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON THE SEDIMENTATION OF SEWAGE. Quarterly rept. 1 Mar-1 June 62, on Contract AT(11-1)-905. Oct 62, 63p. 26 refs. Doc. no. D62-218.

TID-16562 $5.60

Washington U., Seattle.
A COMPUTER PROGRAM FOR EVALUATING RADIOLOGICAL HAZARDS RESULTING FROM THE ATMOSPHERIC RELEASE OF RADIONUCLIDES FROM A REACTOR, by William Edward Haddican. Master's thesis. 30 July 62. 60p. 35 refs.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB 162 554 $1.10

New York State Agricultural Experiment Station, Geneva.
A STUDY OF THE RADIATION-INDUCED SOFTENING OF PLANT TISSUES, by Z. I. Kertesz. Progress rept. no. 5, 1 Feb-31 Mar 59, on Contract DA-129-qm-1164. [1959] 5p. File no. S-522; AD-229 147.

DESCRIPTORS: *Plants, Vegetables, Storage, *Radiation effects, Tissues (Biology), Respiration.

In lettuce leaf irradiation experiments the summarized observations of ten holding tests are presented. Whereas the prolongation of the storage life at 25°C (77°F) is not dramatic, it is significant. Efforts are made to find the reason for this behavior. The respiratory measurements (CO_2 evolution and O_2 consumption) have been extended to cover a wider gamma ray dosage range. Indications are that CO_2 evolution is enhanced at even low radiation dosages. At around 2,750 rad the

increase reaches about 40%. In the range tested the O_2 uptake parallels the CO_2 evolution. The CO_2 evolution is normal again during the following days unless the radiation dosage exceeded 40,000 rad. Neither the previously reported transient-firming nor the enhanced keeping quality seem to show any direct relationship to the results of respiratory activity measurements. When irradiated in air at room temperature, lettuce leaf discs showed the first definite signs of softening at 600,000 rad whereas the samples seem to be ruined from the standpoint of quality at 1 M rad. Further work on lettuce leaves and in model systems is in progress. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

SCTM-138-62(71) $1.60

Sandia Corp., Albuquerque, N. Mex.
MARGINS OF SAFETY FOR BOLTS, by R. D. Hoagland and R. O. Letourneau. June 62, 12p.

Engines and Propulsion Systems

NAA-SR-6727 $3.60

Atomics International, Canoga Park, Calif.
CROCK AND SHOCK: FORTRAN CODES FOR OPTIMIZATION OF HEAT-REJECTION SYSTEMS FOR SPACE POWER PLANTS, by R. A. Stone, R. H. Shudde, and H. L. Friedman. Rept. on Contract AT(11-1)-GEN-8. 1 Nov 61, 42p. 3 refs.

NAA-SR-6490 $4.60

Atomics International, Canoga Park, Calif.
DEVELOPMENT OF A LARGE METAL ULTRAHIGH VACUUM SIMULATION CHAMBER, by F. J. Kamensky. Rept. on Contract AT(11-1)-GEN-8. 1 Nov 61, 41p. 5 refs.

PB 162 371 $1.10

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS, by D. J. Shipp. Progress rept. for Dec 60, on Contract NOw 61-0161-c. 10 Jan 61 7p. Rept. no. DM #61-15; AD-250 285.

DESCRIPTORS: *Rocket motor nozzles, *Graphite, Pyrolysis, Porduction, *Rocket motors.

Fabrication of sub-scale and full-scale rocket nozzle throat inserts of pyrolytic graphite is proceeding on schedule. The initial effort was directed toward fabrication of second stage A3 Polaris throat inserts for Aerojet General Corporation and design of susceptor assemblies for multiple runs as a means of reducing the cost and time for fabrication of nozzle components. (Author)

PB 162 370 $1.10

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS, by D. J. Shipp. Progress rept. for Jan 61, on Contract NOw 61-0161-c. 13 Feb 61, 7p. Rept. no. DM61-51; AD-254 322.

DESCRIPTORS: *Rocket motor nozzles, Coatings, *Graphite, Pyrolysis, *Rocket motors, Production, Carbon deposits, Materials.

Efforts to produce multiple parts from a single run were unsuccessful primarily because of the variation in throat sizes of the various inserts. The susceptor assembly design was such that the reaction gas was preheated in an area directly below the three inserts of different throat diameters that required 0.150 in. coating. The reaction gas then flowed through the inside of the inserts, into another area, where the carbon content of the gas was reduced further before flowing through three inserts that required 0.075 in. coating. This method produced a low rate of deposit in one area and a higher rate of deposit in the other as planned. However, the rate of deposit was considerably higher on the inserts with the smaller throat diameters. Because of this phenomena producing multiple parts from a single run can be accomplished only if the geometry of all the parts is identical. (Author) (See also PB 162 371)

PB 162 372 $2.60

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS, by D. J. Shipp. Progress rept. for Feb 61, on Contract NOw 61-0161-c. 14 Mar 61, 24p. Rept. no. DM #61-82; AD-254 323.

DESCRIPTORS: *Rocket motors, Pyrolysis, *Rocket motor nozzles, *Graphite, Coatings, Production, Carbon deposits, Materials

Progress in the manufacturing of pyrolytic graphite nozzle inserts is described. Exploratory runs with different reaction gas flow rates and variations in the length of deposition time have given useful information for the manufacture of 0.075- and 0.150-in. -thick pyrolytic graphite inserts. Detailed quality control procedures for pyrolytic graphite parts were developed. Nondestructive testing techniques such as zyglo, X-ray, and particularly ultrasonic inspection are expected to help greatly in the interpretation of the results of test firings and in the correlation with defect indications. Checks for dimensional tolerances, density measurements, and metallographic inspection make up the remainder of the quality control procedure being used. (Author) (See also PB 162 370)

PB 162 524 $18.00

General Engineering Lab., General Electric Co., Schenectady, N. Y.
A JET ENGINE SIMULATOR FOR CONTROL DEVELOPMENT, by H. D. Parks. Final rept., Phase 1 on Feasibility Study, Contract AF 33(038)22340. 1 July 52, declassified 30 Dec 55. 283p. 3 refs. Technical Information Series R52GL148; AD-54 147.

DESCRIPTORS: *Jet engines, Fuel systems, *Control simulators, *Computers, Aircraft nuclear propulsion, Statics, Dynamics, Flowmeters, Servomechanisms.

The results of a study to determine the feasibility of constructing a facility to aid in the development of jet engine power controls by providing a simulated engine with which they may be operated are described. From an examination of the functional requirements of such simulator, it is found that these can be met by using two major aggregates of equipment: the first a high speed analog computer operating on the basic and practical equations which govern the performance of engines; and the second a test facility which can accomodate the actual control devices including a fuel system. In recommending a specific design for the simulator, the report gives the results of investigations made to determine the specific characteristics of each of the major components and states that several of these exceed the capabilities of known devices. (Author)

PB 162 526 $23.50

General Engineering Lab., General Electric Co., Schenectady, N. Y.
A JET ENGINE SIMULATOR FOR CONTROL DEVELOPMENT. Final rept. Phase IIA, on Contract AF 33(038)22340. 5 Oct 53, declassified 30 Dec 55. 498p. 6 refs. Rept. no. R53GL209; AD-27 103.

DESCRIPTORS: *Jet engines, *Simulation, *Control systems, Power, *Analog computers, Computers, Design.

The present state of development of a simulator to aid in the development of jet engine power controls is described. The equipment consisting of a large high-speed, high-accuracy analog computer and a mechanical equipment section for the testing of actual controls is delineated. The development of computing components includes amplifiers, generators of functions of one and two variables, multipliers, and power supplies. The mechanical equipment section includes a high-powered servo drive, pressure servos, nozzle discharge chambers, fuel metering and fuel handling facilities. The future course of activity is described for each development, and it is shown that technical goals have been realized in each instance or are capable of realization. (Author)

NASA N63-10327 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL PERFORMANCE OF AN ION ROCKET ENGINE USING A RECTANGULAR-SLAB POROUS-TUNGSTEN EMITTER, by Ronald J. Cybulski, Joseph T. Kotnik, and David L. Lockwood. Nov 62, 27p. 8 refs. Technical note D-1321.

PB 162 417 $3.60

Minnesota U. [Minneapolis].
ANALYSIS OF SLIP DAMPING WITH REFERENCE TO TURBINE BLADE VIBRATION, by L. E. Goodman and J. H. Klumpp. Rept. for June 54-June 55, on Materials Analysis and Evaluation Techniques, Contract AF 33(038)20840. June 55, 37p. 18 refs. WADC Technical note 55-232; AD-76 746.

DESCRIPTORS: *Turbine blades, Joints, Design, Theory, Aerodynamic characteristics, Oscillation, Damping, Stalling.

Energy of vibration may be dissipated by microscopic slip on interfaces where machine elements are joined in a press fit. In this report slip damping is studied as an agent in reducing turbine blade resonant stresses and prolonging turbine life. A general theory of slip damping is developed and an expression for the energy loss per cycle of oscillation is found. The predictions of the theory are compared with the results of controlled experiments. It appears that the theory is in satisfactory agreement with experiment and with measurements made on turbine blades elsewhere in this country and abroad. The implications of the general theory in the design of turbine blades are discussed. It appears that slip damping is capable of being an effective agent in reducing resonant stresses, especially in the 'stall-flutter' condition where aerodynamic damping is inadequate. The design of a slip damping joint which would achieve theoretically possible energy decrements much larger than are present in existing commercial construction is shown to depend on the maintenance of an optimum contact pressure. (Author)

NAA-SR-6306 $4.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
THE SNAP II POWER CONVERSION SYSTEM. MERCURY MATERIALS EVALUATION AND SELECTION, by James F. Nejedlik. Topical rept. no. 14, on Contracts AT(11-1)GEN-8. 10 Apr 61, 48p. 13 refs. TRW rept. no. ER-4461.

MATERIALS

PB 162 444 $8.10

American Lava Corp., Chattanooga, Tenn.
A STUDY AND EVALUATION OF METHODS OF PRODUCING A CERAMIC-TO-METAL SEAL BY PRESSED POWDER TECHNIQUES FOR AUTOMATIC MASS PRODUCTION, by Harry C. Dunegan. Final rept. 16 Aug-30 Nov 60, on Contract AF 33(600)27329. Nov 56, 90p. 5 refs. AD-120 620.

DESCRIPTORS: *Ceramic materials, *Metals, Alloys, *Bonding, Seals, Powders, Manufacturing methods, Industrial production.

A method was developed for producing vacuum tight ceramic to metal seals by means of a pressed powder technique. In this method, layers of ceramic and of metal powders were fabricated in one pressing operation. A single firing cycle matured the ceramic, sintered the metal, and developed the bond. The difficulties in overcoming fabricating and firing problems, in selecting compatible material systems, and in determining optimum bonding conditions were described. The results of over ninety different metal, alloy, and metal oxide mixtures in combination with approximately thirty ceramic formulations were listed. Phase changes in the metallic layers close to the interfaces were used to explain certain types of bonding. (Author)

UCRL-6978 $1.60

Lawrence Radiation Lab., U. of California, Livermor
A COLD HIGH-VACUUM SEAL WITHOUT GASKETS, by Lloyd Mancebo. Rept. on Contract W-7405-eng-48. 1 Sep 62, 13p.

PB 162 557 $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
TROPICAL ICE REMOVER MANUFACTURED BY TROPICAL PAINT AND OIL COMPANY FOR USE AS AN ICE MELTING COMPOUND; REPORT OF EVALUATION OF. Final rept. 9 Sep 57, 19p. 7 refs. Lab. Project 5778-4; AD-160 295.

DESCRIPTORS: *De-icing materials, Tests, Ships, Ice, Countermeasures, Melting.

Tropical Ice Remover is described by the manufacturer as follows: "It is intended for use in removing ice and snow. In pellet form, it is recommended for use on driveways, roads, walks, parking lots, etc., where fast and positive melting action is essential. It is effective for use at temperatures as low as -30°F. The ice remover works by exothermic reaction, and it is the heat produced that melts the ice and snow. Tropical Ice Remover will not harm concrete, asphalt, painted surfaces, tile, linoleum or floors that are unaffected by plain water."

Ceramics and Refractories

TID-17007 $9.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
RECRYSTALLIZATION AND SINTERING OF OXIDES. Progress rept. 1 Sep 61-31 Aug 62, on Contract AT(11-1)-1122. 31 Aug 62, 119p. 15 refs.

UCRL-6725 $3.60

Lawrence Radiation Lab., U. of California, Livermore
SINTERABILITY STUDIES OF BeO COMPACTS, by Raymond Cooperstein. Rept. on Contract W-7405-eng-48. 28 June 62, 31p. 9 refs.

Fuels, Lubricants, and Hydraulic Fluids

Order from GPO $0.45 as
NAS 1.12:130

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYSIS OF THERMAL-PROTECTION SYSTEMS FOR SPACE-VEHICLE CRYOGENIC-PROPELLANT TANKS, by George R. Smolak, Richard H. Knoll, and Lewis E. Wallner. 1962, 41p. 30 refs. NASA Technical rept. R-130; AD-269 981; NASA N62-16706.

DESCRIPTORS: Liquid rocket propellants, *Propellant tanks, *Thermal insulation, Insulating materials, Heat transfer, Space environmental conditions, Space probes, Theory, Mathematical analysis, Shielding, Foils, Reflection, Cryogenics.

Analytical techniques are presented that permit the calculation of heat-transfer rates with various thermal-protection systems for liquid cryogenic-propellant tanks subjected to on-board, solar, and planetary heat fluxes. The effectiveness of these protection systems in reducing propellant heating is shown both for ideal heat-transfer models and for a simplified hydrogen-oxygen terminal stage used for typical Mars missions. (Author)

NASA N63-10627 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF COMPOSITION ON COMBUSTION OF SOLID PROPELLANTS DURING A RAPID PRESSURE DECREASE, by Carl C. Ciepluch. Dec 62, 14p. 8 refs. Technical note D-1559.

NASA N63-10174 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF OXIDIZER PARTICLE SIZE ON ADDITIVE AGGLOMERATION, by Louis A. Povinelli. Nov 62, 31p. 12 refs. Technical note D-1438.

Plastics

NASA N63-10625 $0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
INITIAL WEIGHT LOSS OF PLASTICS IN A VACUUM AT TEMPERATURES FROM 80° TO 500°F, by Hermilo R. Gloria, W. James Stewart, and Raymond C. Savin. Dec 62, 20p. 13 refs. Technical note D-1329.

TID-17019 $6.60

Borden Chemical Co., Philadelphia, Pa.
PREPARATION AND EVALUATION OF SCINTILLATION PLASTICS CONTAINING ORGANOMETALLIC COMPOUNDS FOR GAMMA DETECTION. PART II. COPOLYMERIZATION OF TRIPHENYLTIN STYRENE AND TRIPHENYLLEAD STYRENE WITH STYRENE AND VINYL TOLUENE, by K. C. Tsou, S. R. Sandler, and J. E. Dannin. Progress rept. no. 8, 1 Mar-31 July 62, on Contract AT(30-1)-1930. 8 Oct 62, 66p. 18 refs.

NASA N62-17157 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE FORMULATION AND CASTING TECHNIQUES OF LOW-MODULUS PHOTOELASTIC COATINGS, by A. San Miguel and E. N. Duran. Rept. on Contract NAS7-100. 19 July 62, 30p. 25 refs. Technical rept. no. 32-309.

PB 162 367 $8.10

Material Lab., New York Naval Shipyard, Brooklyn.
RIGID FOAM PLASTICS INFORMATION MANUAL, by I. Resnick. Final rept. Dec 60, 85p. 35 refs. Lab. Proj. 6192; AD-248 189.

DESCRIPTORS: *Expanded plastics, *Foams, Plastics, Physical properties, Sources, Naval supplies, Cellulose acetates, Polymers, Urethanes, Urea, Styrenes, Epoxy resins, Phenols, Formaldehyde, Silicones, Vinyl radicals, Vinyl chlorides, Ethylenes, Acrylonitriles, Butadienes, Ceramic materials, Glass.

The following types of foamed plastics are described with respect to their properties, fields of use, specific Naval applications, sources of supply, equipment used for application of the foam, and military or other specifications: cellulose acetate, polyurethane foams, polystyrene foams, epoxy foam, phenolic foams, syntactic foams (hollow sphere-filled foams), urea-formaldehyde foams, silicone foams, vinyl foams, polyethylene foam, acrylonitrile-butadiene-styrene foam, polyester foam. Nonplastic foams which are also described are glass and ceramic spheres, foamed glass, silica foam, and metal-filled foams.

MATHEMATICS

PB 162 515 $2.60

David Taylor Model Basin, Washington, D. C.
ERRORS IN PHASE ANGLE MEASUREMENTS USING PHASOR SUM AND DIFFERENCE TECHNIQUES, by Alan O. Sykes. May 60, 21p. 3 refs. Rept. 832.

DESCRIPTORS: *Electromagnetic waves, *Phase measurement, Errors, Vector analysis, Difference equations, Noise, Distortion.

The accuracies of several phasor sum and difference techniques for measuring phase angle, dependent on voltage amplitude measurements, are investigated. It is demonstrated that for the greatest accuracy, different measurement techniques, depending on the size of the phase angle, should be used. Curves are presented for estimating the phase angle accuracy and accuracy of measurement of phase angle increments as functions of the angle size and the precision of the voltage amplitude measurements. The effects of noise, distortion, and "pickup" on phase angle accuracy are discussed briefly (Author)

PB 162 548 $12.00

David Taylor Model Basin, Washington, D. C.
LECTURES ON APPLIED MATHEMATICS. THE LAPLACE TRANSFORMATION, by Francis D. Murnaghan. June 59, 170p. Rept. 1346.

DESCRIPTORS: *Applied mathematics, Mathematics, *Integral transforms, Differential equations, Partial differential equations, Series, Integrals, Functions, Bessel functions, Special functions, Polynomials.

These lectures on applied mathematics are devoted to the Laplace Transformation and its application to linear ordinary differential equations with variable coefficients, to linear partial differential equations, with two independent variables and constant coefficients, and to the determination of asymptotic series. The treatment of the Laplace Transformation is based on the Fourier Integral Theorem and the ordinary differential equations selected for detailed treatment are those of Laguerre and Bessel. The partial differential equation governing the motion of a tightly stretched vibrating string and a generalization of this equation are fully treated. Asymptotic series for the integral $\int_p^\infty \exp(-z^2)dz$ and for modified Bessel function $I_n(p)$, $|\arg p| < \frac{\pi}{2}$, are obtained by means of the Laplace Transformation and, finally, asymptotic series useful in the calculation of the ordinary Bessel functions $J_n(t)$ are treated. (Author)

NASA N62-17160 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
IMPLEMENTATION OF ERROR DETECTION AND CORRECTION USING BINARY CYCLIC CODES (PART I) by M. Perlman. Rept. on Contract NAS7-100. 1 Oct 62, 38p. 26 refs. Technical rept. no. 32-324.

NASA N62-17566 $3.60

RIAS, Inc., Baltimore, Md.
INTEGRAL MANIFORDS AND NONLINEAR OSCILLATIONS, by Jack K. Hale. Rept. on Contracts NASr-103, AF 49(638)382, and DA 36-034-ORD-3514. [1962] 32p. 18 refs.

NASA N62-17183 $6.60

RIAS, Inc., Baltimore, Md.
STABILITY OF A CLOSED INVARIANT SET AND ITS NEARBY LYING INVARIANT SETS, by Taro Ura. Rept. on Contracts NASr-103, AF 49(638)382, and DA 36-034-ORD-3514. July 62, 63p. 10 refs. Technical rept. 62-14.

Computing Devices

PB 162 508 $5.60

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME I: SUMMARY, by J. E. Drennan, L. H. Stember and others. Final repr. 30 Apr 56-30 Apr 58, on Subcontract to Contract AF 04(645)20. 30 Apr 58, 53p. [AFBMD] Document no. 62-05-5604.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, Resistors, Diodes, Transistors, Life expectancy, Statistical tests, Statistical data, Simulation, Stresses, Acceleration, Design, Failure (Mechanics).

The primary objectives of this program are to obtain information that can be used for the design and construction of the Remington Rand Univac's ground-based computer system so that the maximum reliability possible

with presently available components can be achieved, to supply the component manufacturers with information such that their product reliability can be improved, and to obtain component reliability information that can be used for the design of other reliable electronic devices.

PB 162 509 $10.50

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME II: PHASE I, SIMULATED-USE LIFE-TEST DESIGN TECHNICAL GUIDANCE, AND DATA PROCESSING, by R. L. Smith L. H. Stember, Jr. and others. Final rept. 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 140p. [AFBMD] Document no. 62-05-5605.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, Resistors, Diodes, Transistors, Life expectancy, Statistical tests, Design *Data processing systems, Simulation.

The detailed objectives of Phase I of Battelle's program were: (1) to design the simulated-use life-test, including component-loading procedures, (2) to provide ITL with technical guidance in designing the automatic data-recording systems and in executing the simulated-use life test, (3) to develop the necessary procedures for handling and reducing the large volume of data resulting from the life test, (4) to conduct a statistical analysis and engineering evaluation of these data.

PB 162 510 $19.75

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME IIIA: SIMULATED-USE LIFE-TEST DATA (RESISTORS), by J. E. Drennan, A. E. Mace and others. Final rept. 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 309p. [AFBMD] Document no. 62-05-5606.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, *Resistors, Life expectancy, Statistical tests, Statistical data, Simulation, *Carbon resistors.

The presentation of resistor data for the simulated-use load-life experiment was designed so that it would provide summarized statistics which could be used in a variety of computations which might arise in the design, operation, and maintenance of a ground-based computer system. (Author)

PB 162 511 $10.50

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME IIIB: SIMULATED-USE LIFE-TEST DATA (DIODES), by J. E. Drennan, A. E. Mace and others. Final rept. for 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 140p. 3 refs. [AFBMD] Document no. 62-05-5607.

DESCRIPTORS: *Digital computers, *Electronic equipment, *Reliability, *Diodes, Germanium, Life expectancy, Statistical tests, Statistical data, Simulation.

Presentation of Type HD2193 diode data for the simulated-use load-life experiment was designed to provide summarized statistics that could be used in a variety of computations which might arise in the design, operation, and maintenance of a ground-based computer system. (Author)

PB 162 512 $19.75

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME IIIC: SIMULATED-USE LIFE-TEST DATA (TRANSISTORS), by J. E. Drennan, A. E. Mace and others. Final rept. for 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 332p. 4 refs. [AFBMD] Document no. 62-05-5608.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, *Transistors, Life expectancy, Statistical tests, Statistical data, Simulation, Germanium alloys.

Presentation of transistor data for the simulated-use load-life experiment was designed to provide summarized statistics that could be used in a variety of computations which might arise in the design, operation, and maintenance of a ground-based computer system. (Author)

PB 162 513-4 $17.00

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME IV: PHASE I. RELIABILITY AND EVALUATION OF COMPONENTS, by A. E. Mace, J. E. Drennan and others. Final rept. for 30 Apr 56-30 Apr 58, on Subcontract to Contract AF 04(645)20. 30 Apr 58, 266p. 16 refs. [AFBMD] Document no. 62-05-5609.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, Transistors, Resistors, Diodes, Life expectancy, Tests, Temperature, Operation.

This volume contains information that is the culmination of the simulated-use life test program for one-half-watt carbon-composition resistors, HD2193 diodes, and ZJ1-501 and ZJ11-501 transistors. In this volume are included estimates based on the simulated-use life test program which describe the inherent reliability of these electronic components. The performance of these components in the simulated-use environment is also evaluated. (Author)

PB 162 514 $6.60

Battelle Memorial Inst., Columbus, Ohio.
THE RELIABILITY OF ELECTRONIC COMPONENTS FOR USE IN REMINGTON RAND UNIVAC GROUND-BASED COMPUTER SYSTEMS. VOLUME VII. DEVEL-

OPMENT OF ACCELERATED LIFE TEST PROCEDURES, by J. E. Drennan, B. C. Spradlin and others. Final rept. for 30 Apr 56-31 Mar 58, on Subcontract to Contract AF 04(645)20. 31 Mar 58, 66p. 2 refs. [AFBMD] Document no. 62-05-5612.

DESCRIPTORS: *Digital computers, Computers, *Electronic equipment, *Reliability, Resistors, Diodes, Transistors, Life expectancy, Stresses, Acceleration, Statistical tests, Design.

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Bureau of the Budget, Washington, D. C.
INVENTORY OF AUTOMATIC DATA PROCESSING (ADP) EQUIPMENT IN THE FEDERAL GOVERNMENT INCLUDING COSTS, CATEGORIES OF USE, AND PERSONNEL UTILIZATION. Aug 62, 126p.

DESCRIPTORS: United States Government, *Data processing systems, Automatic, Supplies, Scheduling.

Contents:
Highlight charts
Summary of ADP installations in the federal government
Inventory of computers - by department
Inventory of computers - by location
Inventory of computers - by make and model

DLCS-4000201 $2.60

Duquesne Light Co., Shippingport, Pa.
AUTOMATIC DATA LOGGING AND COMPUTING SYSTEM SIMULATED OPERATING TEST. 9 Feb 62, 22p.

ORNL-TM-404 $1.60

Oak Ridge National Lab., Tenn.
AN ALGOL COMPILER FOR THE CONTROL DATA CORPORATION 1604, by L. L. Bumgarner, A. A. Grau and others. Progress rept. no. 2 on [Contract W7405-eng-26]. 18 Oct 62, 12p. 7 refs.

PB 162 419 $14.00

RCA Defense Electronic Products, Camden, N. J.
DATA READ-IN, STORAGE, READ-OUT TERMINAL EQUIPMENT (DRISROTE). Rept. on Contract AF 33(616)6230. 30 Nov 60, 209p. WADD Technical rept. 60-915; AD-251 193.

DESCRIPTORS: *Data storage systems, Design, Data processing systems, Reading machines, Data transmission system, Memory devices, *Electronic equipment, Tests, Circuits, *Electronic circuits, Printed circuits.

The problem of multiple input and output digital data storage techniques at bit rates up to and greater than 1 mc for use in aerospace environments is analyzed under the constraint of no mechanical motion. To determine the optimum approach to data storage techniques, a survey of the present state-of-the-art of digital memories was made. This led to the decision to construct a word oriented, 15,360-bit, ferrite-apertured plate memory system which would operate over an ambient temperature range from -55 to + 71 C. This memory was incorporated into a logic system to demonstrate the feasibility of the technique. In order to reduce volume, weight and power requirements, tape-wound magnetic core circuits were used for input, output and internal buffer registers. Investigations were made of unipolar transistor and tunnel diode circuits in a further effort to extend the developed memory techniques to aerospace applications restricted in the allowable amount of ancillary electronic circuits. (Author)

SCTM-71-61(54) $5.60

Sandia Corp., Albuquerque, N. Mex.
A FORTRAN II SUBROUTINE SYSTEM TO PERFORM VARIOUS OPERATIONS ON A TIME SERIES USING THE IBM-704 DIGITAL COMPUTER, by D. A. Young. 20 Feb 61, 57p. 3 refs.

PB 162 450 $14.00

Technical Operations, Inc., Washington, D. C.
INTRODUCTION TO THE CL-I PROGRAMMING SYSTEM, by T. E. Cheatham, Jr., G. O. Collins, Jr. and others. Rept. on Contract AF 33(600)35190. Jan 60, 204p. Technical rept. TR59-6; AD-240 119.

DESCRIPTORS: *Programming (Computers) Digital computers, Computers, *Machine translation, Programming languages.

The purpose of the CL-I programming system is to make digital computers more accessible to problem solvers by allowing the latter to present problems to the computers in languages which are more familiar than the language of the computer. The translation or conversion of such languages into machine language is accomplished by the system itself. The CL-I system is constructed for the IBM-709 computer. The problem class to be serviced is some sub-set of the so-called information-processing problems. The CL-I system has the ability to perform, on request, the following operations: (1) initiate a (new) file of information; (2) prepare to operate on an existing file of information: (3) append to an existing file, (4) collect data and programs from the file, superimpose a supervisory control program and allocation information onto the collection, and append the new process to the file as a program suitable for execution at some future time; (5) delete entities from the file; (6) display entities from the file; (7) execute programs contained on the file; and (8) collect programs and data from the file, and output the collection in a form suitable for independent execution. All tasks are performed under the control of the system. Provisions for cutting the umbilical cord so that well-defined complexes may be executed independently are incorporated and are described. All language operations are discussed in detail.

MECHANICS

NAA-SR-MEMO-7419 $1.60

Atomics International, Canoga Park, Calif.
CODE FOR COMPUTING EXCESS PRESSURE DUE TO "WATER HAMMER", by Douglas Logan. [Rept. on Contract AT(11-1)GEN-8.] 13 June 62, 13p. 3 refs.

NASA N63-10179 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station Va.
BUCKLING OF RING-STIFFENED CYLINDERS UNDER A PURE BENDING MOMENT AND A NONUNIFORM TEMPERATURE DISTRIBUTION, by Melvin S. Anderson and Michael F. Card. Nov 62, 33p. 5 refs. Technical note D-1513.

NASA N62-10631 $1.60

New York U. Coll. of Engineering, N. Y.
CYLINDER INSTABILITY, by George Gerard. Technical status rept. no. 4, 15 Nov 60-15 May 61, on Grant NsG-17-59. [1961] 13p. 5 refs.

NASA N62-10600 $1.10

New York U. Coll. of Engineering, N. Y.
CYLINDER INSTABILITY, by George Gerard. Technical status rept. no. 5, 15 May-15 Nov 61, on Grant NsG-17-59. [1961] 4p.

RM-3105-AEC $3.60

Rand Corp., Santa Monica, Calif.
ELASTIC WAVE CALCULATIONS FOR THE COWBOY PROGRAM, by Blaine R. Parkin. Rept. on Contract AT(04-3)-414. June 62, 33p. 9 refs.

SCTM-81-62(71) $5.60

Sandia Corp., Albuquerque, N. Mex.
INTERNAL BENDING MOMENT AND TENSION AND SHEAR FORCES IN CIRCULAR RINGS DUE TO CONCENTRATED OR UNIFORM RADIAL LOADING, by P. P. Stirbis. May 62, 53p.

NASA N62-16367 $2.60

Stanford U., Calif.
LOWER BOUNDS FOR THE BUCKLING PRESSURE OF SPHERICAL SHELLS., by Nicholas J. Hoff and Tsai-chen Soong. Technical rept. no. 4 on Grant NsG-93-60. July 62, 27p. 7 refs. SUDAER no. 133.

NASA N62-16616 $1.60

Stanford U., Calif.
REQUIREMENTS AND DESIGN FOR A SPECIAL GYRO FOR MEASURING GENERAL RELATIVITY EFFECTS FROM AN ASTRONOMICAL SATELLITE, by Robert H. Cannon, Jr. Rept. on Grant NsG-133-61. [1962] 18p. 9 refs.

Aerodynamics and Pneumatics

NASA N63-10207 $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
HELIUM FILM COOLING ON A HEMISPHERE AT A MACH NUMBER OF 10, by Robert E. Dannenberg. Nov 62, 27p. 13 refs. Technical note D-1550.

NASA N62-16481 $1.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
VIBRATIONAL RELAXATION EFFECTS IN DISSOCIATION RATE-CONSTANT MEASUREMENTS, by Charles E. Treanor. Rept. on Contract NASr-119. Aug 62, 20p. 15 refs. CAL rept. no. AG-1729-A-1.

PB 162 523 $3.60

[Flight and Engineering Test Group, Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
ON THE FLOW OVER A CONE-CYLINDER BODY AT MACH NUMBER ONE, by Hideo Yoshihara. Rept. on Two Dimensional and Axial-Symmetric Transonic Flows Nov 52, 32p. 5 refs. WADC Technical rept. 52-295; AD-3244.

DESCRIPTORS: Fluid flow, *Transonic flow, *Bodies of revolution, *Aerodynamic configurations; Cylindrical bodies, Conical bodies.

The flow over a cone-cylinder body at M= 1 and zero angle of attack was computed by a numerical method in which the subsonic and supersonic regions were obtained by the relaxation method and the method of characteristics, respectively. The sonic line was then determined by an iterative process. The results indicated that the transonic similarity law proposed by von Karman (J. Math. and Phys. Oct. 1947) and Oswatitsch and Berndt (KTH-Aero TN no. 15, Stockholm, 1950) on the basis of slender-body theory can be extended to cover cone-cylinder bodies of practical slenderness ratios.

NASA N63-10205 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION AT MACH NUMBER 3.0 OF EFFECTS OF THERMAL STRESS AND BUCKLING ON FLUTTER CHARACTERISTICS OF FLAT SINGLE-BAY PANELS OF LENGTH-WIDTH RADIO 0.96, by Sidney C. Dixon. Nov 62, 34p. 19 refs. Technical note D-1485.

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HOVERING CHARACTERISTICS OF A ROTOR HAVING AN AIRFOIL SECTION DESIGNED FOR A UTILITY TYPE OF HELICOPTER, by James P. Shivers and William J. Monahan, Dec 62, 33p. 11 refs. Technical note D-1517.

NASA N63-10199 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS AT LOW SUBSONIC SPEEDS OF A HIGHLY SWEPT DELTA WING UTILIZING NOSE DEFLECTION FOR CONTROL, by Bernard Spencer, Jr. Nov 62, 28p, 8 refs. Technical note D-1482.

NASA N63-10206 $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRESSURE DISTRIBUTION INDUCED ON A FLAT PLATE AT A FREE-STREAM MACH NUMBER OF 1.39 BY ROCKETS EXHAUSTING UPSTREAM AND DOWNSTREAM, by Abraham Leiss. Nov 62, 55p. 6 refs. Technical note D-1507; superseded NASA TM-X-129.

NASA N63-10628 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATIC STABILITY TESTS IN THE LANGLEY 24-INCH HYPERSONIC ARC TUNNEL ON A BLUNTED CONE AT A MACH NUMBER OF 20, by Edwin F. Harrison. Dec 62, 22p. 7 refs. Technical note D-1508.

NASA N63-10200 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, V.
TRANSITION AND HOVERING FLIGHT CHARACTERISTICS OF A TILT-DUCT VTOL RESEARCH AIRCRAFT, by Henry L. Kelly. Nov 62, 43p. 7 refs. Technical note D-1491.

NASA N62-16521 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
HEAT TRANSFER AND PRESSURE DISTRIBUTION ON CONE-CYLINDER-FLARE CONFIGURATION WITH BOUNDARY-LAYER SPEARATION, by Harold Ferguson and John W. Schaefer. Oct 62, 40p. 15 refs. Technical note D-1435.

TID-16698 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
PRECISE PRESSURE CONTROL, by E. C. Hutchison. [Rept. on Contract W7405-eng-26]. 31 July 62, 20p. 3 3 refs.

NAA-SR-MEMO-7417 $1.60

Atomics International, Canoga Park, Calif.
HYDRAULIC CHARACTERISTICS OF A SHIELD PLUG ORIFICE, by C. P. Sutherland, [Rept. on Contract AT(11-1)GEN-18]. 23 May 62, 14p.

NASA N63-10336 $2.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
CAVITATION AND NONCAVITATION PERFORMANCE OF AN 80.6° FLAT-PLATE HELICAL INDUCER AT THREE ROTATIONAL SPEEDS, by Donald M. Sandercock, Richard F. Soltis, and Douglas A. Anderson. Nov 62, 82p. 14 refs. Technical note D-1439

NASA N62-16617 $1.60

Advanced Metals Research Corp., Somerville, Mass.
PROPERTIES OF NON-STOICHIOMETRIC METALLIC CARBIDES, by J. T. Norton and R. K. Lewis. Quarterly progress rept. no. 2, 12 May-12 Aug 62, on Contract NASr-98. 10 Aug 62, 15p. 11 refs.

ARF-2230-12 $5.60

Armour Research Foundation, Chicago, Ill.
DELAYED FAILURE HYDROGEN EMBRITTLEMENT OF ZIRCONIUM, by D. Weinstein and F. C. Holtz. Summary rept. 15 Sep 61-14 Sep 62,. on Contract AT(11-1)-578. 10 Oct 62, 59p. 18 refs.

ARF-2198-28 $1.60

Armour Research Foundation, Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS, by D. Weinstein and F. C. Holtz. Quarterly rept. 1 Jan-31 Mar 62, on Contract AT(11-1)-578. 6 Apr 62, 15p. EURAEC-347.

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Atomics International, Canoga Park, Calif.
PHYSICAL AND MECHANICAL METALLURGY OF APM M-257, by R. A. Harlow and R. D. Hahn. [Rept. on Contract AT(11-1)GEN- 8]. 30 Apr 62, 36p. 17 refs.

NASA N62-16622 $1.60

Denver Research Inst., Colo.
RESEARCH ON THE EFFECT OF SELECTED RARE-EARTH SCAVENGERS ON THE PROPERTIES OF TUNGSTEN AND MOLYBDENUM, by C. Samuel Miller and Donald T. Klodt. Quarterly progress rept. no. 2, 1 May-31 July 62, on Grant NsG-61-60. Aug 62, 15p. 1 refs. DRI-2051.

GA-3410 $1.10

General Atomic Div., General Dynamics Corp., . San Diego, Calif.
EFFECT OF NEUTRON IRRADIATION ON MATERIALS SUBJECTED TO MULTI-AXIAL STRESS DISTRIBUTIONS, by T. A. Trozera. Quarterly rept. for period ending 30 June 62 on Contract AT(04-3)167. 13 Aug 62, 9p.

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General Electric Co., Cincinnati, Ohio.
AN INVESTIGATION OF ELECTRICAL DISCHARGE MACHINING AS APPLIED TO CORE DRILLING BERYLLIDES, byR. F. Bucher. Preliminary rept. on Contracts AT(11-1)-171, AF 33(038)21102, and AF 33(600)38062. Mar 60, declassified 21 Sep 62. 38p.

HW-SA-2702 $1.60

Hanford Atomic Products Operation, Richland, Wash.
HIGH INTEGRITY WELDS IN STAINLESS STEEL. TECHNIQUES, REQUIREMENTS, by E. B. LaVelle. Rept. on Contract AT(45-1)-1350. 23 Aug 62, 15p.

HW-73382 $2.60

Hanford Atomic Products Operation, Richland, Wash.
ON CHARGING ALPHA-PHASE Zr-2 WITH HYDROGEN BEYOND THE SOLUBILITY LIMIT, by R. E. Westerman. Interim rept. on Contract AT(45-1)-1350. 2 Apr 62, 21p. 7 refs.

TID-16701 $1.60

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Knolls Atomic Power Lab., Schenectady, N. Y.
MECHANICAL PROPERTIES OF ZIRCALOY-2-NIOBIUM-OXYGEN ALLOYS, by A. E. Bibb and J. R. Fascia. [Rept. on Contract W31-109-eng-52]. 26 Sep 62, 30p. 5 refs.

TID-13960 $1.10

Northwestern U., Evanston, Ill.
RADIATION EFFECT OF POSITIVE ION BOMBARDMENT. Progress rept. 15 June -15 Sep 61, on Contract AT(11-1)-1053. 20 Oct 61, 5p.

NMI-2602 $1.60

Nuclear Metals, Inc., Concord, Mass.
DEVELOPMENT OF TECHNIQUES FOR THE EXTRUSION OF BERYLLIUM TUBING, by R. N. Randall and F. M. Yans. Rept. on Contract AT(30-1)-1565. 30 June 60, declassified 20 July 62. 22p.

NMI-2108 $1.60

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. on Contract AT(30-1)-2784. 1 Oct 62, 14p. 19 refs.

NMI-2109 $1.60

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. Aug 62, on Contract AT(30-1)-2784. 29 Oct 62, 13p. 10 refs.

ORNL-TM-356 $2.60

Oak Ridge National Lab., Tenn.
DEVELOPMENT OF ULTRASONIC TECHNIQUES FOR THE EVALUATION OF BRAZED JOINTS, by K. V. Cook and R. W. McClung. Rept. on Contract W-7405-eng-26. 23 Oct 62, 25p. 6 refs.

ORNL-TM-327 $3.60

Oak Ridge National Lab., Tenn.
RELATION BETWEEN OXYGEN DISTRIBUTION AND CORROSION IN SOME REFRACTORY METAL-LITHIUM SYSTEMS, by J. R. DiStefano and E. E. Hoffman. Rept. on Contract W-7405-eng-26. 4 Oct 62, 35p. 14 refs.

SCTM-249-61(14) $1.10

Sandia Corp., Albuquerque, N. Mex.
THE EFFECT OF IMPERFECT VACUA UPON THE PURITY OF EVAPORATED MATERIALS, by G. L. Krieger. Jan 62, 9p.

Ferrous Metals

MSAR-62-23 $1.10

MSA Research Corp., Callery, Pa.
EFFECT OF 1200F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 18, Feb 62, on Contract AT(11-1)-765. 13 Mar 62, 8p.

ORNL-TM-339 $3.60

Oak Ridge National Lab., Tenn.
EFFECT OF CO_2 ON THE STRENGTH AND DUCTILITY OF TYPE 304 STAINLESS STEEL AT ELEVATED TEMPERATURES, by W. R. Martin and H. E. McCoy, Jr. Rept. on Contract W-7405-eng-26. 27 Sep 62, 41p. 4 refs.

ORNL-TM-338 $1.60

Oak Ridge National Lab., Tenn.
GRAPHITE-STAINLESS STEEL COMPATIBILITY STUDIES, by B. Fleischer, J. H. DeVan, and J. H. Coobs. Rept. on Contract W-7405-eng-26. 25 Sep 62, 19p. 6 refs.

PB 162 465 $5.60

Powder Metallurgy Lab., Stevens Inst. of Tech., Hoboken, N. J.
HIGH STRENGTH STEELS BY POWDER METALLURGY, by Edmund B. Wilson, Frances H. Clark, and Gregory J. Comstock. Summary rept. 15 Oct 59-15 Oct 60, on Contract DA 30-069-504-ORD-2852. Oct 60, 56p. AD-250 827.

DESCRIPTORS: *Steel, Sintering, Casting, Mechanical properties, Powder metallurgy, Processing, Heat transfer.

Non-corrosive, low residue liquid vehicles were developed for the permanent suspension of -100 mesh, spherical, prealloyed low alloy steel powders. These slips have metal contents up to 60% by volume, and possess sufficient fluidity for casting simple shapes in plaster molds. Vacuum mixing of vehicles and slips improved the as-cast density. Pressure casting of air mixed slips give casting densities comparable to those achieved by vacuum mixed slips conventionally cast. Ram packing of metal powder pastes in plaster molds offers a potential technique for the low pressure forming of shapes from metal powders. Slip cast preforms of AISI 4130 and AISI 4340 powder were sintered to an intermediate density and hot coined to densities comparable to wrought bar stock. (Author)

Structural Metallurgy and Corrosion

TID-16833 $4.60

Missouri School of Mines and Metallurgy, Rolla.
CORROSION OF NUCLEAR METALS. CORROSION OF NUCLEAR AND OTHER METALS. Final rept. on Contracts AT(11-1)-73 and AT(11-1)-1047, for the years 1956-1962. June 62, 41p. 29 refs.

PB 162 546 $2.60

Naval Ordnance Lab., White Oak, Md.
REFERENCE RADIOGRAPHS FOR STEEL AIRCRAFT CASTINGS, PROGRESS IN PREPARATION, by I. J. Feinberg, E. L. Criscuolo, and R. A. Youshaw. Rept. for July 58-Dec 59. 18 Feb 60, 30p. NAVORD rept. 6811; AD-239 609.

DESCRIPTORS: *Steel castings, Quality control, *Radiography, Standards, Non-destructive testing, Aircraft, Handbooks, *Airframes.

Progress in preparation of a proposed set of reference radiographs for the inspection of thin-wall high strength steel precision aircraft castings is discussed. Specialized requirements with respect to casting materials, discontinuities, size effects and radiographic techniques are presented. The program for obtaining material with designed discontinuities to provide radiographic illustrations is discussed. Plans for collaborating with the American Society for Testing Materials and with the Aerospace Industries Association in preparation of the proposed manual are outlined. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-16666 $1.10

Argonne National Lab., Ill.
ALPHA SCATTERING BY THE TITANIUM ISOTOPES, by H. W. Broek and J. L. Yntema. [Rept. on Contract W31-109-eng-38]. June 62, 5p.

TID-16665 $1.10

Argonne National Lab., Ill.
COLLECTIVE LEVELS IN $Ni^{58,60,62}$ AND $Zn^{64,66,68}$, by Howard W. Broek. [Rept. on Contract W31-109-eng-38]. June 62, 6p. 1 ref. UAC-6576.

TID-16749 $1.10

Argonne National Lab., Ill.
SENIORITY MIXING IN $lf_{7/2}$ NUCLEI, by B. Zeidman and R. D. Lawson. [Rept. on Contract W31-109-eng-38] June 62, 4p. 3 refs.

WAPD-T-1459 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
CALCULATION OF COMPLEX NATURAL MODES FOR SPATIAL XENON OSCILLATIONS AND COMPARISON WITH A SIMPLE APPROXIMATION, by R. L. Ewen. [Rept. on Contract AT(11-1)GEN-14]. Presented at the American Nuclear Society Meeting, June 1962. 15p. 6 refs.

BNL-6332 $1.10

Brookhaven National Lab., Upton, N. Y.
ELECTRON-ATOM SCATTERING AND NUCLEON-NUCLEUS SCATTERING, AN ANALOGY, by Murrey D. Goldberg. 5 Oct 62, 6p. 5 refs.

XDC-60-2-28 $1.60

General Electric Co., Cincinnati, Ohio.
NEUTRON AND PHOTON TRANSPORT THROUGH SHIELDING MATERIALS, by T. D. Roberts. Preliminary rept. on Contracts AT(11-1)-171, AF 33(038)21102, and AF 33(600)38062. 15 Oct 59, declassified 5 Oct 62. 17p. 11 refs.

HW-SA-2740 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE RADIOLOGICAL PHYSICS OF PLUTONIUM, by C. M. Unruh. Rept. on Contract AT(45-1)-1350. 20 Aug 62, 15p. 8 refs.

TID-16989 $1.10

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
A COMPUTER PROGRAM USEFUL IN THE ANALYSIS OF GAMMA SPECTRA AND ANGULAR CORRELATION DATA, by R. M. Woods, Jr. and M. L. Wiedenbeck. Rept. on Contract AT(11-1)-1112. [1961] 4p. 2 refs.

IDO-12023 $2.60

Idaho Operations Office, Atomic Energy Commission, Idaho Falls.
DETERMINATION OF RADIUM 226 IN MILL EFFLUENTS, by Earl R. Ebersole, Alan Harbertson and others. Oct 59, rev. July 60. 26p. 2 refs.

UCRL-9686 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
EVIDENCE FOR A T=O RESONANCE IN THE $\Sigma\pi$ SYSTEM, by Margaret H. Alston, Luis W. Alvarez and others. Rept. on Contract W-7405-eng-48. 28 Apr 61, 13p. 9 refs.

UCRL-10220 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
TEST OF ISOTOPIC SPIN CONSERVATION IN STRONG INTERACTIONS FROM AN EXPERIMENT LIMIT ON $\sigma(d + d \rightarrow He^4 + \overset{0}{\pi})$, by John A. Poirier and Morris Pripstein. Rept. on Contract W-7405-eng-48. 25 May 62, 11p. 2 refs.

NYO-10024 $1.60

Little, Arthur D., Inc., Cambridge, Mass.
THE EFFECT OF ELECTROPHILIC ADDITIVES ON THE RADIOLYTIC PRODUCTS OF ORGANIC CHAIN REACTIONS. Quarterly rept. May-July 62, on Contract AT(30-1)-2904. 1 Aug 62, 11p.

TID-16950 $1.60

Michigan U., Ann Arbor.
GAMMA-RAY TRANSITIONS IN ^{32}S FOLLOWING PROTON CAPTURE BY ^{31}P, by P. R. Chagnon and P. A. Treado. [1962] 15p. 9 refs.

TID-16511 $2.60

National Lead Co. of Ohio, Cincinnati.
CHEMISTRY OF RADIOACTIVE COMPONENTS OF URANIUM MILL WASTES, by M. A. DeSesa. 1962. 22p. 8 refs. Prepared for presentation at the 48th National meeting of the American Institute of Chemical Engineers, Denver, Colorado, August 26-29, 1962.

PB 162 516 $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
DOSE-TIME-DISTANCE CURVES FOR CLOSE-IN FALLOUT FOR LOW YIELD LAND-SURFACE NUCLEAR DETONATIONS, by G. Henry and A. D. Anderson. 30 Dec 59, 14p. 2 refs. Research and development technical rept. USNRDL-TR-390; AD-233 344.

DESCRIPTORS: *Atomic bomb explosions, *Radioactive fall-out, Radiation effects, Dose rate, Wind, *Meteorology, Personnel.

Radiation dose computations made with the NRDL dynamic fallout model for low-yield land-surface bursts were used to show graphically the time after burst required for exposed personnel to accumulate certain doses from deposited fallout as a function of downwind distance from ground zero. The curves indicate that significant doses may be accumulated rapidly within several miles downwind depending upon the yield and wind conditions. Since the effects of airborne radioactivity (transit dose) were not considered in this study, the curves indicate total accumulated doses (deposited only) which are less than the total doses which would be expected otherwise. (Author)

PB 162 545 $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
RESPONSE OF PHOTOGRAPHIC EMULSIONS TO THERMAL AND EPITHERMAL NEUTRONS, by T. T. Mercer and R. Golden. 28 Dec 60, 21p. 10 refs. Rept. no. TR-493; AD-250 809.

DESCRIPTORS: *Photographic emulsions, *Radiation damage, *Thermal neutrons, Cadmium, Silver, Dose rate.

The amount of activation by thermal and epithermal neutrons of silver in a photographic emulsion was calculated in terms of thermal neutron flux and cadmium ratio as determined by gold foils 1.27 cm in diameter by 0.0297 cm thick. The dose rate distributions around point sources of Ag108 and Ag110 were also calculated and used to determine the dose to a photographic emulsion resulting from activation of its own silver by thermal and epithermal neutrons. Experimental support for the calculations was obtained using Dupont No. 555 film. The dose to an emulsion due to thermal neutrons only could be expressed as D(th) equals 0.46 x 10 to the minus 10 (nvt) t sub Ag rads, where (nvt) is the average thermal neutron flux in neutrons/sq cm and t sub Ag is the silver content of the emulsion in mgm/sq cm. The ratio of the total dose to an emulsion due to both thermal and epithermal neutrons to the dose due to thermal neutrons only was obtained as a function of cadmium ratio. (Author)

ORNL-TM-361 $8.60

Oak Ridge National Lab., Tenn.
DEVELOPMENT OF A GENERAL METHOD OF EXPLICIT SOLUTION TO THE NUCLIDE CHAIN EQUATIONS FOR DIGITAL MACHINE CALCULATIONS, by D. R. Vondy. Rept. on Contract W-7405-eng-26. 17 Oct 62, 87p. 15 refs.

ORNL-TM-307 $1.10

Oak Ridge National Lab., Tenn.
TWO AUXILIARY CODES FOR USE WITH RENUPAK, by D. K. Trubey. [Rept. on Contract W7405-eng-26]. 10 Aug 62, 5p. 2 refs.

ORNL-TM-384 $1.10

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U-Th RECOVERY FROM PYROLYTIC CARBON-COATED CARBIDE FUEL PARTICLES BY ELECTROLYSIS IN NITRIC ACID, by A. H. Kibbey and L. M. Ferris. [Rept. on Contract W7405-eng-26]. 26 Sep 62, 7p. 9 refs.

RRL-90 $1.60

Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
QUARTERLY REPORT. Rept. for 1 July-30 Sep 62, on Contract AT(30-1)-2310. 15 Oct 62, 16p. 3 refs. (Q-21).

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Rensselaer Polytechnic Inst., Troy, N. Y.
ASYMPTOTIC AND TRANSIENT ANALYSIS OF PULSED MODERATORS, by P. B. Daitch and D. B. Ebeoglu. [1962] 23p. 12 refs.

TID-17205 $1.10

Washington U., Seattle.
EFFECTS OF REGGE POLES ON THE POLARIZATION IN HIGH ENERGY NUCLEON-NUCLEON SCATTERING, by Ivan J. Muzinich. Rept. on Contract AT(45-1)-1388. 1 Oct 62, 6p.

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Washington U., Seattle.
AN INVESTIGATION OF THE SILICON SURFACE-BARRIER FAST NEUTRON SPECTROMETER, by Robert Lee Kelly. Master's thesis. 1962, 61p. 24 refs.

TID-16963 $3.60

Wisconsin U., Madison.
DOUBLE COULOMB EXCITATION WITH OXYGEN IONS, by R. Graetzer and E. M. Bernstein. [1962] 31p. 26 refs.

TID-16557 $1.10

Yale U., New Haven, Conn.
STRANGE PARTICLE RESONANCE FROM π^+ - p INTERACTIONS AT 2 Gev, by H. W. Foelsche, E. C. Fowler and others. 27 June 62, 8p. 2 refs.

Elementary Particles

TID-12043 $1.10

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SPIN-ORBIT SPLITTING AND PION THEORETIC L-S POTENTIAL, by Akito Arima, Masao Sugawara, and Tokuo Terasawa. [Rept. on Contract W31-109-eng-38]. Sep 60, 9p. 11 refs.

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TID-16852 $1.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
IONIZATION AND CHARGE TRANSFER CROSS SECTIONS, by D. W. Martin, J. W. Hooper and others. Technical status rept. no. 12, 1 June 31-Aug 62, on Contract AT(40-1)-2591. 1 Sep 62, 14p. 2 refs.

UCRL-10310 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
INTERACTIONS OF K^- MESONS IN HYDROGEN IN THE 300- TO 850- MeV/c REGION, by Pierre L. Bastien, J. Peter Berge and others. Rept. on Contract W-7405-eng-48. 19 June 62, 11p. 5 refs.

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STUDY OF STRANGE-PARTICLE RESONANT STATES PRODUCED IN 1.89-2.24 GeV/c π^- + p INTERACTIONS, by Gideon Alexander, Laurence Jacobs and others. Rept. on Contract W-7405-eng-48. 11 June 62, 12p. 8 refs.

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Lawrence Radiation Lab., U. of California, Berkeley.
TEST OF CHARGE SYMMETRY OF K^+ AND K^o MESONS IN THE ASSOCIATED PRODUCTION PROCESS, by Janice Button-Shafer, Frank S. Crawford and others. Rept. on Contract W-7405-eng-48. 5 June 62, 13p. 3 refs.

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UNSTABLE PARTICLES IN S-MATRIX THEORY, by Henry P. Stapp. Rept. on Contract W-7405-eng-48. 23 May 62, 8p. 6 refs.

PB 162 448 $4.60

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
RESULTS OF TESTING THE RADIACMETER MODEL PAC-1S, by William C. Bryan. Oct 59, 45p. Technical note AFSWC-TN-59-27; AD-230 609.

DESCRIPTORS: *Alpha counters, Design, Scintillation counters, Radiation counters, Tests

Events leading to standardization of the Radiacmeter, alpha scintillation counter PAC-1S for Air Force use are summarized, and a description of the instrument is given. Various tests to which the PAC-1S and the type

BC-1 battery charger were subjected are described, along with their results. These tests included visual and mechanical inspection, electrical measurements, radiation tests, environmental and mechanical tests, field tests, and some observations of the charge-discharge behavior of the PAC-1S zinc-silver oxide batteries. (Author)

ARF-1209-6 $1.60

Armour Research Foundation, Chicago, Ill.
STUDY OF THE CAPABILITY OF ISOTOPIC SOURCE OF SECONDARY RADIATION, by J. J. Ezop. Quarterly rept. no. 2, 1 June-31 Aug 62, on Contract AT(11-1)-578. 10 Sep 62, 12p.

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FULL SCALE CLOSURE TEST, by J. F. Patterson, S.P. Wnuk, and E. A. Bemis. Rept. on Contract AT(11-1)-589. 20 Sep 62, 155p. 3 refs.

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AMES LABORATORY RESEARCH REACTOR AMES. IOWA. Preliminary hazards summary rept. on Contract AT(11-1)-855. May 60, 272p. 26 refs.

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THE DEVELOPMENT AND TESTING OF THE UO_2 FUEL ELEMENT SYSTEM. Quarterly rept. on Contract AT(30-1)-2379 Mar 61, declassified 5 Sep 62. 56p. NYO-9011.

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THE NATURE OF BOILING WATER REACTOR INSTABILITY, by Joseph A. Fleck, Jr. Rept. on Contract W-7405-eng-48. 16 Jan 61, 6p. 3 refs.

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MONTHLY TECHNICAL REPORT. Rept. for Mar 62, on Contract AT(11-1)-476. 20 Aug 62, 20p.

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(d, t) REACTIONS ON NUCLEI NEAR N = 28, by T. H. Braid and B. Zeidman. [Rept. on Contract W31-109-eng-38]. June 62, 5p. 3 refs. UAC-6522.

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SINGLE NEUTRON TRANSFER REACTIONS OF Co^{59}, by A. M. Friedman. [Rept. on Contract W31-109-eng-38]. 6 Sep 62, 6p. 1 ref. UAC-6507.

BNL-6211 $1.60

Brookhaven National Lab., Upton, N. Y.
K^- -p INTERACTIONS AT 2.24 Bev/c II: PRODUCTION PROPERTIES, by L. Bertanza, V. Brisson and others. 27 July 62, 18p. 4 refs.

NYO-9287 $8.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
MEASUREMENT OF THE RATE OF THE REACTION $\mu^- + C^{12} \rightarrow B^{12} + \nu$, by Eugene J. R. Maier. Rept. on Contract AT(30-1)-882. May 62, 100p. 37 refs.

NYO-9288 $5.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEON ANTI-NUCLEON ANNIHILATIONS INTO TWO PARTICLE FINAL STATES, by Nicholas J. Sopkovich. Doctoral thesis. Rept. on Contract AT(30-1)-882. June 62, 59p. 25 refs.

UCRL-10222(Rev.) $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
ELASTIC K^- -p SCATTERING BETWEEN 700 AND 1400 MeV/c, by E. F. Beall, W. Holley and others. Rept. on Contract W-7405-eng-48. 15 Aug 62, 13p. 6 refs.

UCRL-9553 $5.60

Lawrence Radiation Lab., U. of California, Berkeley.
KINEMATICS AND DISPERSION RELATIONS FOR GENERAL PRODUCTION PROCESSES, by Martin Kretzschmar. Rept. on Contract W-7405-eng-48. 2 Feb 61, 58p. 17 refs.

UCRL-6506-T $1.10

Lawrence Radiation Lab., U. of California, Livermore
(p, n) REACTIONS IN MIRROR NUCLEI AND THE NUCLEAR TWO-BODY FORCE, by Stewart D. Bloom and Norman K. Glendenning. [Rept. on Contract W7405-eng-48. 1962] 3p.

TID-16965 $3.60

Wisconsin U., Madison.
POLARIZATION IN STRIPPING REACTIONS, by W. Haeberli. [1962] 31p. 37 refs.

UCRL-10337 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
THE REACTION $K^* + P \rightarrow K^* + N^*_{33}$, by W. Chinowsky, G. Goldhaber and others. Rept. on Contract W-7405-eng-48. 27 June 62, 16p.

Radioactivity

TID-16960 $3.60

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
BETA-GAMMA DIRECTIONAL CORRELATION MEASUREMENT IN As^{76}, by H. J. Fischbeck and R. W. Newsome, Jr. Rept. on Contract AT(11-1)-1112. [1962] 35p. 26 refs.

TID-16984 $2.60

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
DECAY OF Se^{81m} AND Se^{81}, by R. E. Sund and M. L. Wiedenbeck. Rept. on Contract AT(11-1)-1112. [1960] 21p. 14 refs.

NYO-9934(Vol. III) (Ext.) $2.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
STRONTIUM-90 ASSAY OF VARIOUS ENVIRONMENTAL MATERIALS. Sr^{90} IN CERTAIN DIETS IN SOUTH AMERICA AND SOUTHEAST ASIA 1959-60, by R. S. Hirshman and A. R. Schulert. Rept. on Contract [AT(30-1)-1656]. [Oct 61] 30p. 6 refs.

NYO-9934(Vol. I) $22.25

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
STRONTIUM-90 IN MAN AND HIS ENVIRONMENT. VOLUME I: SUMMARY, by J. Laurence Kulp and Arthur R. Schulert. Rept. on Contract AT(30-1)1656. May 62, 372p. 142 refs.

TID-16971 $1.60

Michigan U., Ann Arbor.
POLARIZATION CORRELATIONS FOLLOWING THE DECAY OF Ge^{77}, by M. B. Martin and M. L. Wiedenbeck. Rept. on Contract AT(11-1)-1112. [1961] 19p. 11 refs.

PB 162 445 $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
STONEMAN II TEST OF RECLAMATION PERFORMANCE. VOLUME I: THE PRODUCTION, DISPERSAL AND MEASUREMENT OF SYNTHETIC FALLOUT MATERIAL, by W. B. Lane and J. D. Sartor. 6 June 60, 57p. 9 refs. Research and development technical rept. USNRDL-TR-334; AD-248 068.

DESCRIPTORS: *Radioactive fall-out, *Radioactive isotopes, Lanthanum; Production, Distribution, Measurement, Tests, Radioactive mean life, *Soils *Contamination, Gamma emission, Simulation, Monitors.

A field test was conducted in the fall of 1958 wherein multicurie amounts of radioisotopes were used to prepare ton quantities of synthetic fallout for the evaluation of land reclamation procedures. The processing of the radioisotope La^{140}, the procedures for radio-tagging clay soil, and the measuring of gamma radiation from large contaminated areas are described. The factor for converting gamma radiation measurements to equivalent weights of soil was determined so that decontamination effectiveness could be expressed in mass units. (Author)

NEVIS-110 $1.10

Nevis Cyclotron Lab., Columbia U., Irvington-on-Hudson, N. Y.
COMPARISON OF η, τ, AND τ' DECAYS, by D. Berley, D. Colley, and J. Schultz. Rept. on Contract AT(30-1)-1932. Oct 62, 7p. 4 refs. R-343; CU-216.

Waste Disposal

HW-SA-2739 $1.60

Hanford Atomic Products Operation, Richland, Wash.
ANALOG SIMULATION OF HANFORD GROUND WATER FLOW, by R. W. Nelson and W. A. Haney. Rept. on Contract AT(45-1)-1350. 15 Aug 62, 15p. 10 refs.

HW-SA-2726 $1.60

Hanford Atomic Products Operation, Richland, Wash.
COATING WASTE MEASUREMENT, by W. H. Johnson, R. A. Schneider, and W. H. Zimmer. Rept. on Contract AT(45-1)-1350. 10 Sep 62, 13p. 3 refs.

HW-SA-2744 $2.60

Hanford Atomic Products Operation, Richland, Wash.
LABORATORY, PILOT AND FIELD SCALE STUDIES OF FISSION PRODUCT MIGRATION RATES IN SOIL, by J. L. Nelson, W. A. Haney and others. Rept. on Contract AT(45-1)-1350. 5 Sep 62, 23p. 16 refs.

HW-74371 $1.60

Hanford Atomic Products Operation, Richland, Wash.
LABORATORY STUDIES ON IN-TANK CONCENTRATION OF COATING REMOVAL WASTE, by J. E. Mendel. Preliminary rept. on Contract AT(45-1)-1350. 6 Aug 62, 21p. 4 refs.

HW-75051 $1.10

Hanford Atomic Products Operation, Richland, Wash.
PUREX PLANT TEST OF THE CESIUM NICKEL FERROCYANIDE PROCESS, by S. J. Beard and W. C. Schmidt. Rept. on Contract AT(45-1)-1350. 25 Sep 62, 8p. 3 refs.

ORNL-TM-376 $7.60

Oak Ridge National Lab., Tenn.
WASTE TREATMENT AND DISPOSAL, by E. E. Blanco and E. G. Struxness. Progress rept. Apr-May 62, on [Contract W7405-eng-26]. 5 Nov 62, 72p. 21 refs.

PHYSICS

PB 162 552 $1.60

Metals Research Lab., Brown U., Providence, R. I.
ATTENUATION AND VELOCITY MEASUREMENTS IN 1013 STEEL AS A FUNCTION OF DEFORMATION AND HEAT TREATMENT, by Akira Hikata and Rohn Truell. Rept. on Contracts DA 19-020-ORD-2598 and DA 19-020-501-ORD-3984. Jan 58, 13p. Rept. WAL 143/14-51; AD-162 488.

DESCRIPTORS: *Steel, Wave transmission, *Ultrasonic radiation, Attenuation, Deformation, Heat treatment, Internal friction.

Ultrasonic attenuation measurements were made at 7 and 8 mc/sec in 1013 steel specimens being deformed under loading. For a steel specimen heat treated at 600° C in air for 1 hr, the attenuation first increased as strain was increased to a value of about 0.07% and then decreased, until at about 0.3% strain the attenuation was nearly the same as was observed before deformation began. Between 0.3 and 1.5% strain, both load and attenuation were independent of strain. Between about 1.7 and 1.8% strain, attenuation decreased from 0.175 db μsec to 0.172 db/μ sec which was accompanied by a load decrease of about 300 pounds and a slight increase in strain. As the specimen was unloaded, the attenuation increased to a value about the same as that observed at 0.07% strain. The experiment was repeated with specimens of the same 1013 steel heat treated (1) at 700° C for 3 hr, and (2) at 870° C for 1 hr before deformation. Similar load-strain behaviors were quite different. With the 700° C-3 hr specimen, the initial increase in attenuation reached a maximum at 0.03% strain. This was followed by a decrease of 0.04 db/μ sec between 0.03 and 0.3% strain with a slight increase between 0.3 and 1.7% strain and a further increase during unloading. In the case of the 870° C-1 hr specimen, the attenuation decrease from a peak at zero strain to a minimum at 0.3% strain. In each case the minimum attenuation during deformation occurred at the same strain as the yield point.

PB 181 454 $2.25

National Bureau of Standards, Boulder, Colo.
AN ATLAS OF WHISTLERS AND VLF EMISSIONS. A SURVEY OF VLF SPECTRA FROM BOULDER, COLORADO, by D. L. Jones, R. M. Gallet and others. Jan 63, 110p. 3 refs. Technical note no. 166.

DESCRIPTORS: *Whistlers, Electromagnetic waves, Very low frequency, Radiofrequency spectroscopy, Lightning, Magnetic fields, Noise (Radio).

Naturally occurring VLF noises are classified and spectrograms illustrating each class are presented. The report is divided into six sections. The first section consists of the systematic classification of VLF noises. Samples of whistlers and VLF emissions are shown in the second and third sections, respectively. The next section gives examples of interactions between these two classes. Section five consists of some exceptionally active periods during magnetic disturbances. The last section is a synoptic survey for the four months, March through June, 1957. A spectrogram is given for every observation period containing any VLF activity. (Author)

PB 162 427 $2.60

Navy Electronics Lab., San Diego, Calif.
SONAR STUDIES OF THE DEEP SCATTERING LAYER IN THE NORTH PACIFIC, by W. E. Batzler and E. C. Westerfield. 8 Jan 53, 24p. 30 refs. Rept. 334; AD-5030.

DESCRIPTORS: *Pacific Ocean, *Underwater sound, Scattering, *Underwater sound transmission, Sonar, Sonar equipment, Echo ranging, Diurnal variations, Plankton, Abundance.

The structure and diurnal variation of the deep scattering layer in the North Pacific were determined from quantitative scattering data obtained during a 24-hr station in the Queen Charlotte Islands area and a 24-hr station near Adak Island. Analysis and comparison of the data with similar data obtained near Guadalupe Island indicated that (1) the peak magnitude of the volume scattering in the North Pacific was roughly the same as that in the California coastal areas; (2) peak values of the scattering coefficient for the main layer were such that about one millionth of the transmitted sound energy was lost per yard travel of the sound wave; (3) the observed diurnal vertical movement of the main scattering layer in the North Pacific was less than 200 yd, as compared with a movement of approximately 500 yd in the Guadalupe area; the maximum observed rates of ascent and descent were 2 ft per min and 1 ft per min for the Queen Charlotte and Adak areas, respectively, as compared with 8 ft per min for the Guadalupe area; (4) 2 deep scattering layers which did not appear to partici pate in the diurnal vertical movement were observed to be common to all 3 areas; one was at a depth of about 450 yd, while the other was at about 750 yd; and (5) the presence of a main scattering layer in a wide region of isothermal water in the Adak Island area precludes the possibility of the scattering there being due to thermal discontinuities in the water.

NASA N62-16347 $1.60

Radioscience Lab., Stanford U., Calif.
THE VLF ADMITTANCE OF A DIPOLE IN THE LOWER IONOSPHERE, by R. F. Mlodnosky and O. K. Garriott. Rept. on Grants NsG-174-61 and NsG-30-60. [1962] 16p. 13 refs.

Electricity and Magnetism

TID-17218 $4.60

Case Inst. of Tech., Cleveland, Ohio.
EFFECT OF LATTICE VIBRATIONS ON SPIN-SPIN RELAXATION TIMES IN SOME PARAMAGNETIC MATERIALS, by Donald Wright. Master's thesis. Technical rept. no. 20, on Contract AT(11-1)-623. June 62, 49p. 24 refs.

TID-16718 $8.10

Florida U., Gainesville.
THE TIME LAGS OF ELECTRICAL BREAKDOWN IN THE MAGNETIC FIELD, by S. T. Nolan, H. W. Kendall, and J. W. Flowers. Technical rept. no. 5 on Contract AT(40-1)-2783. 20 Aug 62, 81p. 18 refs.

NASA N63-10369 $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE MAGNETIC FIELD OF A MODEL RADIATION BELT NUMERICALLY COMPUTED, by Syun-Ichi Akasofu (U. of Alaska), Joseph C. Cain, and Sydney Chapman (U. of Alaska). Nov 62, 22p. 18 refs. Technical note D-1447.

NASA N62-16987 $3.00

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
MEASUREMENTS OF THE GEOMAGNETIC FIELD BY THE VANGUARD III SATELLITE, by Joseph C. Cain, Ivan R. Shapiro and others. Oct 62, 152p. 25 refs. Technical note D-1418.

UCRL-7028 $1.60

Lawrence Radiation Lab., U. of California, Livermore
A NEUTRON DIFFRACTION STUDY OF NiS, by Joseph T. Sparks and Ted Komoto. Rept. on Contract W-7405-eng-48. 22 Oct 62, 8p. 8 refs.

NASA N63-10180 $0.50

Lewis Research Center, National Aeronautics and Space Administration.
EXPERIMENTAL INVESTIGATION OF A 90° FLAT-PLATE MAGNETIC TRIODE FOR DIRECT ENERGY CONVERSION, by Richard R. Cullom. Nov 62, 14p. 5 refs. Technical note D-1532.

MSUCP-8 $3.60

Michigan State U., East Lansing,
MISTIC PROGRAM FOR COMPUTATION OF THE MAGNETIC FIELD OF A CIRCULAR CURRENT, by B. T. Smith. Master's thesis. Rept. on Contract AT(11-1)-872. Nov 60, 36p. 5 refs.

Molecular Physics and Spectroscopy

TID-16686 $3.60

Argonne National Lab., Ill.
FAR INFRARED SPECTRA OF PHOSPHORUS COMPOUNDS, by John R. Ferraro. [Rept. on Contract W31-109-eng-38]. May 62, 33p. 17 refs.

TID-16851 $1.60

Emory U., Atlanta, Ga.
INFRARED DETERMINATION OF CHLORATE IN THE PRESENCE OF OTHER OXYHALOGEN ANIONS, by Michael W. Miller, Robert H. Philp, Jr., and A. L. Underwood. [1961]. 11p. 9 refs.

TID-16670 $3.60

Mellon Inst. [of Industrial Research] Pittsburgh, Pa.
VIBRATIONAL SPECTRA OF SOME MCl_5 MOLECULES: $SbCl_5$, PCl_5, $TaCl_5$ AND $NbCl_5$, by Gerald L. Carlson. Rept. on Contract AT(30-1)-1993. 19 Sep 62, 35p. 36 refs.

TID-16671 $1.60

Mellon Inst. [of Industrial Research] Pittsburgh, Pa.
THE VIBRATIONAL SPECTRUM OF $Si(NCS)_4$, by Gerald. L. Carlson. Rept. on Contract AT(30-1)-1993. 19 Sep 62, 17p. 10 refs.

TID-15707 $6.60

Vanderbilt U., Nashville, Tenn.
AN ANALYSIS OF THE INFRARED SPECTRA OF CF_3COCl AND CF_3COBr, by Robert James Lovell. Master's thesis. 30 Mar 53, 63p. 27 refs.

TID-15745 $3.60

Vanderbilt U., Nashville, Tenn.
THE INFRARED SPECTRUM OF THIONYL BROMIDE, by Gareth Eugene Guest. Master's thesis. Aug 56, 36p. 14 refs.

TID-14461 $1.10

Western Reserve U., Cleveland, Ohio.
MOLECULAR STRUCTURES AND THERMODYNAMIC PROPERTIES OF FLUORINE CONTAINING GASES, by E. L. Pace. Technical progress rept. 1 Apr 61-31 Mar 62, on Contract AT(30-1)-824. 4p. 8 refs.

Optics

PB 162 519 $1.60

[Institute of Science and Tech.] U. of Michigan, Ann Arbor.
WORKING GROUP ON INFRARED BACKGROUNDS. PART ONE: AIMS, CONCLUSIONS, AND RECOMMENDATIONS ON BACKGROUND INFORMATION, ed. by R. Clark Jones. Rept. on Contract Nonr-1224(12). 28 May 56 rev. 25 Mar 57, pub. July 57, declassified. 18p. 2 refs. Rept. no. 2389-7-S; AD-137 936.

DESCRIPTORS: *Infrared research, *Infrared detectors, Interference, *Thermal targets, Detection, Identification

Significant IR background problems were studied (a background is considered to be any distribution of radiance that is capable of interfering with the detection or identification of a target) and the scientific basis of IR backgrounds is summarized. The following conclusions and recommendations are made. The dissemination of background reports is as good as that for other classified fields. Future contracts for the construction of IR equipment should provide for necessary background studies. Hardware contracts should require background information to be reported separately (in terms that are not specifically related to the properties of the measuring device. The preparation of these reports should not be restricted by military specifications which pertain to the reports on military hardware. Support should be given to such information and summarizing agencies as ASTIA and IRIA by placing them on the distribution list for all reports. Radiation and spectrum measurements are in a generally useful form but the amount and applicability of spatial distribution information are inadequate. A project for preparing handbooks on background information is recommended. Annual symposia on backgrounds should be held. Background information is urgently needed at altitudes near and above 40,000 ft. Spatial distribution information is needed that achieves a resolution element approaching 0.1 milliradian square. Further development of instruments is needed for high-altitude and high-resolution work.

PB 162 520 $2.60

[Institute of Science and Tech., U. of Michigan, Ann Arbor].
THE WORKING GROUP ON INFRARED BACKGROUNDS PART II: CONCEPTS AND UNITS FOR THE PRESENTATION OF INFRARED BACKGROUND INFORMATION. Rept. on Contract Nonr-1224(12). Nov 56, 21p. Rept. no. 2389-3-S; AD-123 097.

DESCRIPTORS: *Infrared research, *Infrared detectors, *Thermal targets, Detection, Identification.

This report describes the concepts and units which the working Group on Infrared Backgrounds recommends for the description of infrared backgrounds. The Group hopes that wide acceptance of these recommendations will expedite the dissemination of information on infrared backgrounds and will increase the usefulness of this information to equipment designers. (Author)

NASA N62-16489 $2.60

Melpar, Inc., Falls Church, Va.
DETECTION OF EXTRATERRESTRIAL LIFE. METHOD II. OPTICAL ROTATORY DISPERSION, by Ira Blei. Final rept. on Contract NASr-85. Aug 62, 22p.

Solid State Physics

TID-16743 $2.60

Argonne National Lab., Ill.
PARAMAGNETIC RESONANCE ABSORPTION IN PEROXO-DICOBALT COMPLEXES - SINGLE CRYSTAL STUDIES, by John A. Weil, Gordon L. Goodman, and Harry G. Hecht. [Rept. on Contract W31-109-eng-38]. June 62, 28p. 8 refs. UAC-6591.

NAA-SR-MEMO-6921 $1.10

Atomics International, Canoga Park, Calif.
ACCEPTOR DOPANTS FOR LEAD TELLURIDE, by J. O. McCaldin. [Rept. on Contract AT(11-1)GEN-8]. 6 Dec 61, 11p. 6 refs.

BMI-X-210 $1.60

Battelle Memorial Inst., Columbus, Ohio.
GROWTH OF UO_2 SINGLE CRYSTALS, by J. D. Jackson and C. A. Alexander. Summary rept. 17 Sep 62, 17p.

TID-17027 $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
RADIATION EFFECTS IN SOLIDS. Final rept. 1 Apr 61-31 June 62, on Contract AT(30-1)-1828. 12 Oct 62, 15p. 8 refs.

TID-17212 $7.60

Case Inst. of Tech., Cleveland, Ohio.
LOW TEMPERATURE THERMAL EXPANSION COEFFICIENT OF RbI, by D. E. Schuele. Technical rept. no. 23 on Contract AT(11-1)-623. Oct 62, 72p. 37 refs.

TID-17206 $4.60

Case Inst. of Tech., Cleveland, Ohio.
A PRELIMINARY STUDY OF THIN GADOLINIUM FILMS, by Harold J. Peters. Technical rept. no. 21 on Contract AT(11-1)-623. Aug 62, 36p. 15 refs.

NYO-10444 $2.60

Rutgers U. Coll. of Engineering, New Brunswick, N.J.
LATTICE DEFECTS OF QUARTZ INDUCED BY FAST NEUTRON IRRADIATION, by S. Weissmann, T. Imura and others. Technical rept. no. 1 on Contract AT(30-1)-2937. Sep 62, 25p. 26 refs.

PB 162 642 $10.10

Sylvania Electric Products, Inc., Bayside, N. Y.
ELECTRICAL PROPERTIES OF SAPPHIRE, by Julius Cohen. Final rept. on Contract Nonr-1840(00). 15 Apr 59, 121p. 47 refs. Rept. no. TR 59-203.1, formerly YD 57-6-11; AD-238 711.

DESCRIPTORS: *Sapphires, Electrical properties, *Electrical conductance, *Single crystals, Vacuum furnaces, Crystals.

The subject of electrical conductivity of alumina is reviewed taking into account experimental method as well as lattice imperfections. Examples are chosen to include both single crystals and polycrystals measured under a variety of experimental conditions. The composite result forms an incoherent picture which cannot be interpreted conclusively. The reason for this situation is attributed to structure-sensitivity and to insufficient rigor in the modus operandi. The objectives of this research are (1) to measure the electrical conductivity of sapphire, in vacuum, using the potential probe method at high temperatures; (2) to investigate and evaluate contact effects; and (3) to investigate surface conduction. (Author)

Theoretical Physics

UCRL-9517 $9.10

Lawrence Radiation Lab., U. of California, Berkeley.
THE ADIABATIC MOTION OF CHARGED PARTICLES IN ELECTROMAGNETIC FIELDS, by Theodore G. Northrop. Rept. on Contract W-7405-eng-48. Jan 61, 104p. 40 refs.

ORO-556 $2.60

Miami U., Coral Gables, Fla.
A THEORETICAL INVESTIGATION OF THE DIFFUSION OF A CHARGED PARTICLE IN A PLASMA UNDER THE INFLUENCE OF A SINUSOIDALLY OSCILLATING EXTERNAL MAGNETIC FIELD, by Martin E. Shucart. Rept. on Contracts AT(40-1)-2761 and AF 19(604)8082.

TID-15504 $6.60

Stevens Inst. of Tech., Hoboken, N. J.
PLASMA PHYSICS LECTURE NOTES, CHAPTER V, by George Schmidt. Rept. on Contract AT(30-1)-2813. Summer 1961, 69p. 19 refs. SIT-P59(3/62)

Thermodynamics

PB 162 493 $1.10

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
CELLS DRAWN FROM TANTALUM, MOLYBDENUM AND PLATINUM FOR HIGH TEMPERATURE RESEARCH, by George W. Ziegler, Jr., Rudolph Speiser, and H. L. Johnston. Technical rept. no. 3 on High Temperature Thermodynamics of Inorganic Substances, Contract N6ori-17, T.O. 4. 15 Apr 49, 8p. 3 refs. Project RF-280; ATI-64 985.

DESCRIPTORS: *High temperature research, Refractory materials, *Tantalum, *Molybdenum, *Platinum, Dies, Cylindrical bodies, Instrumentation, Materials.

Cylindrical cells, containers and furnace elements can be fabricated of tantalum, molybdenum and platinum sheet for use in high temperature research. These refractory materials have been used to fabricate seamless Knudsen cells employed in vapor pressure measurements, furnace elements in a high temperature x-ray camera, and sample containers for high temperature calorimetry.

PB 162 437 $1.60

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
HIGH TEMPERATURE X-RAY DIFFRACTION CAMERA, by H. L. Johnston. Technical rept. no. 1 on Contract N6ori-17, T.O. IV. 1 Sep 48, 13p. 4 refs. Project no. 280; ATI-87 963.

DESCRIPTORS: *X-ray diffraction cameras, Design, High temperature research, Photographic equipment

The camera described in this paper has been developed as a part of a research program devoted to the study of the thermodynamics and physical properties of inorganic solids at elevated temperatures. With the aid of induction heating a high temperature powder diffraction camera (of the Straumanis type) has been designed which will yield x-ray photographs at temperatures in excess of 2500°K.

UCRL-6959-T $1.10

Lawrence Radiation Lab., U. of California, Livermore.
EXTREMIZATION OF ENTROPY PRODUCTION RATES, by Laurence S. Hall. [Rept. on Contract W7405-eng-48]. 14 Sep 62, 6p. 6 refs.

UCRL-9672 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
A SENSITIVE DIFFERENTIAL PRESSURE SYSTEM FOR MEASURING CRYOGENIC LIQUID DEPTHS, by William L. Pope and Edwin F. McLaughlin. Rept. on Contract W-7405-eng-48. 21 Apr 61, 5p.

UCRL-9298 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
USE OF PYROELECTRIC DEVICES FOR MEASURING SMALL TEMPERATURE CHANGES, by Sidney B. Lang. Rept. on Contract W-7405-eng-48. July 60, 17p. 8 refs.

NASA N62-17744 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
COMBINED RADIATION AND FORGED CONVECTION FOR FLOW OF A TRANSPARENT GAS IN A TUBE WITH SINUSOIDAL AXIAL WALL HEAT FLUX DISTRIBUTION, by Robert Siegel. Oct 62, 35p. 7 refs. Technical note D-1441.

NASA N63-10175 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ON THE EFFECT OF HEAT ADDITION IN THE EMPIRICAL CORRELATION OF VOID FRACTIONS FOR STEAM-WATER FLOW, by Uwe H. von Glahn and Richard P. Polcyn. Nov 62, 38p 13 refs. Technical note D-1440.

TID-17179 $12.00

Michigan U., Ann Arbor.
SOLID SOLUTION, TRANSITIONS, AND THERMODYNAMICS OF MIXING IN THE PLASTICALLY CRYSTALLINE SYSTEM TETRAMETHYLMETHANE-TETRACHLOROMETHANE, by Elfreda Chang. Doctoral thesis. Rept. on Contract AT(11-1)-1149. 1962, 155p. 87 refs.

TID-16987 $1.60

Michigan U., Ann Arbor.
THERMODYNAMIC PROPERTIES OF ACTINIDE CARBIDES WITH SPECIAL REFERENCE TO THE ENTROPIES OF URANIUM MONO- AND DICARBIDE, by Edgar F. Westrum, Jr. [Oct 62,] 17p. 15 refs.

NASA N63-10173 $1.25

Minnesota U., Minneapolis.
HEAT-TRANSFER CHARACTERISTICS OF SEVERAL RADIATOR FINNED-TUBE CONFIGURATIONS, by E. M. Sparrow and W. J. Minkowycz. Nov 62, 47p. 6 refs. NASA Technical note D-1435.

NYO-10448 $1.10

New York Operations Office, Atomic Energy Commission, N. Y.
A DIFFUSION THEORY ANALYSIS OF BOILING BURNOUT IN THE FOG FLOW REGIME, by Leonard Topper. Sep 62, 10p. 2 refs.

Wave Propagation

Order from GPO $0.60 as
C 13.46:127

National Bureau of Standards, Boulder, Colo.
BIBLIOGRAPHY ON DIRECTION FINDING AND RELATED IONOSPHERIC PROPAGATION TOPICS, 1955-1961, ed. by Olaf D. Remmler. Oct 62, 117p. 850 refs. Technical note 127.

DESCRIPTORS: *Bibliography, *Direction finding, Antennas, Radio waves, Propagation, *Ionospheric propagation, Radar equipment, Navigation aids.

This bibliography is an outgrowth of a conference held at the University of California at Los Angeles in June 1960 to discuss the aspects of long-range high-frequency radio propagation that affect radio location and direction finding, and the related problems of measurement and analysis. In connection with the conference the Numerical Analysis Research Staff of UCLA prepared a bibliography of published work on the conference subject covering the period 1955-1959. For this Technical Note the UCLA bibliography has been edited and extended to include some papers published in 1960 and the first half of 1961.

Order from GPO $0.45 as
C 13.46:158

National Bureau of Standards, Boulder, Colo.
EFFICIENT USE OF THE RADIO SPECTRUM, by Kenneth A. Norton. Apr 62, 80p. 103 refs. Technical note 158.

DESCRIPTORS: *Radio waves, *Propagation, *Radio broadcasting, *Wave transmission, Interference, Radio receivers, Signal-to-noise ratio, Television stations, Television communication systems, *Radio communication systems, Communication systems.

Methods are given for determining the transmitter power required for satisfactory operation in the presence of noise on any given telecommunications link. It is then suggested that sufficiently high power should be used so that a satisfactory grade of service will be achieved at all times. The above conclusion has reference only to the problem of reception in the absence of interference from other telecommunications systems. It is then shown that optimum use of the spectrum can be achieved only when interference from other signals rather than from noise provides the ineluctable limit to satisfactory reception. The fact that interference, rather than noise, should provide the ineluctable limit to satisfactory reception indicates that greater stress should be placed on the use of various techniques for making systems free of mutual interference rather than designing them simply with the objective of overcoming noise. Most of the report deals with statistical methods of using the concept of transmission loss on the propagation paths in order to achieve the above described optimum use of the spectrum. (Author)

PB 162 429 $10.50

Navy Electronics Lab., San Diego, Calif.
SYMPOSIUM ON TROPOSPHERIC WAVE PROPAGATION, 25-29 JULY 1949, by F. W. Schott. 15 June 50, 135p. 15 refs. Rept. no. 173.

DESCRIPTORS: Troposphere, *Radio waves, *Propagation, Refraction, Scattering, Meteorological phenomena, *Symposia.

Reports presented at five sessions covering problems of refraction, scattering, and hydrometeors, etc. are included.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

NASA N62-17209 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
POWER SPECTRA OF SIGNALS MODULATED BY RANDOM AND PSEUDORANDOM SEQUENCES, by R. C. Titsworth and L. R. Welch. Rept. on Contract NASw-6. 10 Oct 61, 50p. 9 refs. Technical rept. no. 32-140.

NASA N62-16462 $9.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. RESEARCH SUMMARY NO. 36-8. Rept. for 1 Feb - 1 Apr 61 on Contract NASw-6. 1 May 61, 117p. 88 refs.

NASA N62-16464 $9.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. RESEARCH SUMMARY NO. 36-10, VOLUME I. Rept. for 1 June-1 Aug 61, on Contract NASw-6. 1 Sep 61, 102p. 74 refs.

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National Cancer Inst., Bethesda, Md.
RESEARCH AND RELATED PROGRAMS OF THE NATIONAL CANCER INSTITUTE INCLUDING A ROSTER OF STAFF, ADVISORY BODIES AND CONSULTANTS [1962] 53p. Public Health Service Publication no. 458-A.

DESCRIPTORS: *Cancer research, Education, Medical laboratories, Medical personnel, *Scientific organizations, Training, *Medical research.

Contents:
The National Cancer Institute
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National Science Foundation, Washington, D. C.
REVIEWS OF DATA ON RESEARCH AND DEVELOPMENT NUMBER 35. SCIENTIFIC RESEARCH AND OTHER PROGRAMS OF PRIVATE FOUNDATIONS, 1960. Aug 62, 6p. 10 refs. NSF 62-28.

DESCRIPTORS: *Scientific research, Scientific organizations, *Economics, Costs, *Medical research, *Education, Scientific personnel.

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NS 1.11:36

National Science Foundation, Washington, D. C.
REVIEWS OF DATA ON RESEARCH AND DEVELOPMENT NUMBER 36. RESEARCH AND DEVELOPMENT IN AMERICAN INDUSTRY, 1961. Sep 62, 12p. 10 refs. NSF 62-32.

DESCRIPTORS: *Industrial research, *Scientific research, *Economics, Costs

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FS 2.22/33:1

Public Health Service, Washington, D. C.
RESOURCES FOR MEDICAL RESEARCH. FEDERAL EXPENDITURES FOR MEDICAL AND HEALTH-RELATED RESEARCH, 1960-1963, by Joseph Rosenthal. Rept. no. 1. Aug 62, 16p. 10 refs. Publication no. 969.

DESCRIPTORS: *Medical research, Scientific research, Economics, Costs, *Federal budgets.

The present publication is the first of a series of reports analyzing aspects of the medical research effort which are of widespread interest. This report presents a broad picture of Federal expenditures for medical research and the construction of research facilities, data for which were collected by the National Institutes of Health at the request of the Bureau of the Budget.

SOCIAL SCIENCES

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Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-Seventh Congress, Second Session.
1961-62 MANAGEMENT SURVEY OF THE U. S. PATENT OFFICE, by Earl W. Kinter and others. Committee Print, 87th Congress, 2d session, pursuant to S. Res. 267. 1962 172p.

DESCRIPTORS: *Management engineering, Reports, Federal government, Department of Commerce, *Patents.

Documentation

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NS 1.16:15

National Science Foundation, Washington, D. C.
SCIENTIFIC INFORMATION ACTIVITIES OF FEDERAL AGENCIES NUMBER 15. U.S. AIR FORCE. PART II: OFFICE OF AEROSPACE RESEARCH. Sep 62, 22p. NSF 62-17.

DESCRIPTORS: *Documentation, Federal government, Scientific organizations, *Military organizations, *Air Force, Military publications, *Scientific reports, Periodicals, Scientific research, Propulsion, Materials, Electronics, Geophysics, Biology, Aeronautics, Nuclear weapons, Nuclear engineering, Space environmental conditions

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Office of Science Information Service, National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION NO. 10, by Eugene Pronko, Nancy R. Donald, and Ruth M. Smits. May 62, 395p. NSF-62-20.

DESCRIPTORS: *Scientific research, Reports, *Documentation, *Information retrieval, Storage, *Machine translation, Pattern recognition, *Artificial intelligence, Speech representation, Philology, *Psychology.

Contents:
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Science and Technology Div., Library of Congress, Washington, D. C.
JAPANESE SCIENTIFIC AND TECHNICAL SERIAL PUBLICATIONS IN THE COLLECTIONS OF THE LIBRARY OF CONGRESS, by Chi Wang and Jay H. Woo. 1962, 250p. 1,670 refs.

DESCRIPTORS: Bibliography, *Documentation, *Periodicals, Scientific reports, *Japan, Libraries

This bibliography of Japanese serials in science and technology is intended as a guide to the collections and holdings of the Library of Congress in these fields. The majority of the titles included are published in Japan; the remainder are published in Korea, Manchuria, Okinawa, Formosa, and other parts of the world. Serials in Japanse (1316) and Western languages (354), both current and noncurrent, are listed. The bibliography is divided into two parts: part I is devoted to serials in Western languages (mostly in English) which are in the general collections; part II includes serials in Japanese which are in the custody of the Orientalia Division.

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